VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the **issuance** of the VPDES permit listed below. This permit is being processed as a **Major, Municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et.seq. The discharge results from the operation of a 2.7 MGD wastewater treatment plant consisting of: influent pump station, screening facilities, operations building, grit removal system, dual moving bed biofilm reactors, flash mix tank, ballasted sedimentation reactor tank, dual secondary clarifiers, dual aerobic digesters, control building with ultraviolet light disinfection system and solids press, and cascade aerator. Final sludge disposal is discussed in item 10. below.

This permit action consists of limiting pH, BOD_5, suspended solids, ammonia nitrogen, E.coli and dissolved oxygen; including special conditions regarding compliance reporting, control of significant dischargers, whole effluent toxicity testing, PCB sampling and minimization, water quality criteria monitoring, biosolids use and disposal, other requirements and special conditions. SIC Code: 4952

1. Facility Name and Address:
Big Rock/Conaway Wastewater Treatment Plant
State Route 700, Conaway, Buchanan Co.

2. **Permit No. VA0092916**

3. Owner Name and Address:
Buchanan County Public Service Authority
P.O. Box 30
Vansant, VA 24656

Owner Contact:
Gregory McClanahan
Title: Executive Director
Telephone No: 276-935-5827

Facility Contact:
Name: Phillip Vandyke
Title: Plant Superintendent
Telephone No: 276-530-7770

4. Application Complete Date: 05/16/2016
Permit Drafted By: Fred M. Wyatt, SWRO Date: 4/04/2016
Reviewed By: Steve E Arthur Date: 5/16/2016
Public Comment Period Dates: from _____ to _____

5. Receiving Stream Name: Levisa Fork; River Mile: 6ALEV130.63 Basin: Tennessee-Big Sandy River; Subbasin: Big Sandy River; Section: 3; Class: IV; Special Standards: None. Lat.: 37°21'16" ; Long.: 82°13'00"

7-Day, 10-Year Low Flow (7Q10): 8.6 MGD (June - Dec.)
1-Day, 10-Year Low Flow (1Q10): 7.3 MGD (June - Dec.)
7Q10 High Flow: 37.3 MGD (Jan. - May)
1Q10 High Flow: 27.3 MGD (Jan. - May)
30-Day, 10-Year Low Flow (30Q10): 12.0 MGD (June - Dec.)
30Q10 High Flow: 82.5 MGD (Jan. - May)
Harmonic Mean Flow (HM): 60 MGD

Tidal? No

303(D) list? Yes (See Item # 13 below)

6. Operator License Requirements: Class II

7. Reliability Class: II

8. Permit Characterization:
( ) Private ( ) Federal ( ) State (X) POTW ( ) PVOTW
( ) Possible Interstate Effect ( ) Interim Limits in Other Document

9. Attach a schematic of and provide a brief description of the wastewater treatment system.

Discharge Description

OUTFALL NUMBER	DISCHARGE SOURCE (1)	TREATMENT (2)	DESIGN FLOW (3)
001	Town of Grundy, communities of Big Rock and Conaway and surrounding sections of Buchanan County	See Page 1 above, first paragraph	2.7 MGD

10. Sewage Sludge

Sewage Sludge Treatment Process: Sludge is treated in dual aerobic digesters and solids press. Biosolids produced in this manner are disposed of in either of two options: (1) The Tazewell County Landfill; (2) BFI Carter Landfill in Church Hill, Tennessee.

11. Discharge Location Description: See attached Harman VA-KY Quadrangle; Number: 118C

12. Material Storage: None reported

13. Ambient Water Quality Information: The 2014 Impaired Water Fact Sheets (attached) list Levisa Fork as impaired from Rocklick Branch at Big Rock downstream to the Kentucky state line. The impairment is for aquatic life use (benthics) due to sediments, recreation use (bacteria), and fish consumption (PCBs). The source of the benthics impairment is listed as coal mining. The source of the bacterial impairment is listed as sewage discharges in unsewered areas. The source of the impairment due to PCBS is listed as unknown.

A TMDL was developed for these impairments and was approved by EPA on March 18, 2011. 303(d) fact sheets and selected summary sheets in the TMDL are attached. The TMDL incorporates the bacterial and sediment (solids) loadings for existing Conaway 2.0 MGD WWTP (VA0090531) and requires no reductions for these loadings. The TMDL contains an E.coli WLA of 5.39E+12 cfu/year and a sediment WLA of 82.96 tons/year. Permit No. VA0090531 has an E.coli limit of 126 n(cfu)/100 ml that is in compliance with the TMDL. Permit No. VA0090531 has total suspended solids limits of 230 kg/day (monthly average) and 340 kg/day (weekly average) which are in compliance with the TMDL.

A 60.58% reduction of the long term average PCBs concentration of 1624 mg/year is required for the discharge from this facility, resulting in a

WLA = 1,769.76 mg/year, where the existing condition is 4,489.85 mg/yr. Permit No. VA0090531 includes a special condition requiring PCBs monitoring and a pollutant minimization plan. The concentration from that results in a TMDL WLA of 640 pg/L at a design flow of 2.0 MGD. This permit will be terminated upon completion of construction and issuance of a Certificate to Operate for the new 2.7 MGD WWTP.

For the new VPDES Permit No. VA0092916 and higher design flow of 2.7 MGD (35% flow increase), the existing TMDL is affected as follows:

Bacteria: There is a future growth of FG = 2.00E+12 of final average in-stream E.coli bacteria loads (cfu/year) which should be sufficient to handle a growth associated with a 35% flow increase resulting in a new WLA = 7,28E+12 cfu/year.

Sediment: There is a future growth FG = 194.97 tons/year, which should be sufficient to handle a growth associated with a 35% flow increase, resulting in a new WLA = 112 tons/year.

PCBs: The WLA of 1769.76 mg/yr. in the existing TMDL will be retained and applied to the new plant. Therefore, the needed reductions will apply to the new plant and the TMDL will not be modified at this time. The higher design flow of the new plant is not to serve additional customers; in fact the customer base is declining due to the loss of coal mining related jobs and business in the county. The PSA has presented an Engineering Analysis where the most effective alternative is to treat I/I rather than remove it from the system. Therefore, the higher design flow of the new plant is solely to treat (infiltration/inflow) (I/I).

In contrast, DEQ has an enforcement order issued to the PSA to conduct a sewer system evaluation study and correct problems in the collection system over a 5 year timeframe. This effort is expected to improve the integrity of the system and remove significant I/I.

14. Antidegradation Review & Comments: Tier I (X) Tier II Tier III
The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters. The antidegradation review begins with a Tier determination. Since the receiving stream is listed on the 303(D) Report as impaired, it is considered as Tier I.

15. Site Inspection: October, 2015 by Bill Spencer, SWRO.

16. Effluent Screening & Limitation Development:

a. *pH:*

A pH range of 6.0 - 9.0 standard units is assigned to Class IV waters per the Virginia Water Quality Standards.

b. *Biochemical Oxygen Demand BOD_5 and Dissolved Oxygen:*

The staff used the steady state Streeter Phelps Regional Modeling System (V 4.0) to project acceptable dissolved oxygen and biochemical oxygen demand. The 7Q10 flow frequency was used in these calculations. TKN values used in the model were calculated by adding a 3 mg/l refractory nitrogen value to the ammonia nitrogen toxicity values which were calculated based on the Virginia Water Quality Standards. The model indicated that secondary treatment level BOD_5 effluent limitations (30 mg/l monthly average and 45 mg/l weekly average) were adequate to protect aquatic life.

c. *Total Suspended Solids:*

Total Suspended Solids effluent concentrations are 30 mg/l monthly average and 45 mg/l weekly average, which are the minimum Federal secondary treatment levels.

d. *Ammonia Nitrogen:*

Effective on August 27, 2003 the State Water Control Board adopted new criteria for ammonia nitrogen (9VAC25-260-155). An acute ammonia nitrogen standard is now calculated without consideration of the stream temperature. The 90^{th} percentile pH from Storet data at milemarker 6ALEV131.52 was used with the ammonia tables in the Water Quality Standards to determine the acute ammonia criteria value. The acute criteria are more restrictive if the trout species are present (*only Class V or VI waters*). The 1Q10 flow frequency value and high flow 1Q10 frequency value were used to calculate the steady state waste load allocations for both the low stream flow season and the high stream high flow season respectively.

A chronic ammonia nitrogen standard is now calculated by considering whether or not the early life stage of fish are present or absent. The 30Q10 flow frequency value and the high flow 30Q10 frequency value are used to calculate the steady state waste load allocations for both the low stream flow season and the high stream high flow season respectively.

The 90^{th} percentile pH from Storet data at milemarker 6ALEV131.52 and dry and wet season temperatures, based on Storet data and best professional judgment, were used to determine the chronic criteria value from the Water Quality Standards.

Effluent ammonia values were also determined using EPA's new 2013 aquatic life ambient water quality criteria for ammonia. A special condition is being included in the permit requiring the permittee to design treatment facilities to meet these calculated effluent

values. These calculated values cannot be enforced as effluent limitations, since the State Water Control Board has not yet adopted the EPA criteria as Virginia Water Quality Standards.

e. *E.coli Bacterial Standards:* A geometric mean 126 n/100 ml is assigned to Class IV waters, per the Virginia Water Quality Standards.

Basis for Effluent Limitations: 2.7 MGD WWTP

PARAMETER	BASIS FOR LIMITS *	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow	NA	NL	NA	NA	NL	Continuous	Totalizing Indicating & Recording
PH	2	NA	NA	6.0 SU	9.0 SU	1/Day	Grab
BOD_5	1,5	30 mg/l 310 kg/d	45 mg/l 460 kg/d	NA	NA	3 Days/Wk.	24 Hour Composite
Total Suspended Solids	1	30 mg/l 310 kg/d	45 mg/l 460 kg/d	NA	NA	3 Days/Wk.	24 Hour Composite
Ammonia Nitrogen (June-Dec.)	2,5	5.8 mg/l	7.8 mg/l	NA	NA	3 Days/Wk.	24 Hour Composite
Dissolved Oxygen	2,5	NA	NA	6.0	NA	1/Day	Grab
E.coli, n/100 ml	2	126 (Geometric Mean)	NA	NA	NA	1/Day	Grab

*1. Federal Effluent guidelines
2. Water Quality-based Limits
3. Best Engineering Judgment
4. Best Professional Judgment
5. Other (e.g wasteload allocation model)

The DEQ VPDES Permit Manual recommends 5-7 days/week monitoring for BOD_5, total suspended solids, and NH_3-N. The past performance data of the existing 2.0 MGD WWTP indicates that 3 days/week monitoring is adequate.

17. Basis for Sludge Use & Disposal Requirements: VPDES Permit Regulation, 9VAC25-31-100 P; 220 B.2.; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

18. Antibacksliding Statement: Since this permit action is a new issuance, the antibacksliding provisions of the Permit Regulation (9 VAC 25-31-220.1) do not apply.

19. Compliance Schedules: None

20. Special Conditions:

PART I.B. Special Condition - Compliance Reporting
Rationale: Authorized by VPDES Permit Regulation, 9VAC25-31-190 J 4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

PART I.C. Special Condition - Control of Significant Dischargers
Rationale: VPDES Permit Regulation, 9VAC25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to meet specified regulations.

PART I.D. Special Condition - Whole Effluent Toxicity Testing
Rationale: VPDES Permit Regulation, 9 VAC25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.

PART I.E. Special Condition - PCBs Minimization and Monitoring:
Rationale: State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, Subpart 131.11.

In the approved TMDL for Levisa Fork, the existing VPDES Permit No. VA0090531 has a PCB wasteload allocation (WLA) of 1,769.76 mg/yr. or 1.77 g/yr. and an existing load of 4,489.85 mg/yr. or 4.49 g/yr. The TMDL requires a 60.58% reduction. Additional effluent samples have yielded results of 2,967.0 pg/l, 2,863.2 pg/l, 2,592.0 pg/l, 4,870.0 pg/l, and 4,182.8 pg/l Based on this data and the effluent flows at the time of sampling, a mean load of 5.50 g/yr. was calculated. This data justifies requiring a PMP.

PART I.F. Other Requirements and Special Conditions:

1. **95% Capacity Reopener**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-200 B 4 for all POTW and PVOTW permits

2. **Indirect Dischargers**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-200 B 1 and B 2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

3. **CTC, CTO Requirement**
Rationale: Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790.

4. **Operation and Maintenance Manual Requirement**
Rationale: Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190 E.

5. **Licensed Operator Requirement**
Rationale: The VPDES Permit Regulation, 9VAC25-31-200 C and the Code of Virginia § 54.1-2300 et seq, Board for Waterworks and Wastewater Works Operators and Onsite Sewage System Professional Regulations (18VAC160-20-10 et seq.), require licensure of operators.

6. **Reliability Class**
Rationale: Required by the Sewage Collection and Treatment Regulations, 9 VAC25-790 for all municipal facilities.

7. **Treatment Works Closure Plan**
Rationale: This condition establishes the requirement to submit a closure plan for the treatment works if the treatment facility is being replaced or is expected close. This is necessary to ensure treatment works are properly closed so that the risk of untreated waste water discharge, spills, leaks, or other exposure to raw materials is eliminated and water quality is maintained. Section 62.1-44.21 requires every owner to furnish when requested plans, specifications, and other pertinent informations as may be necessary to determine the effect of the wastes from this discharge on the quality of state waters, or such other information as may be necessary to accomplish the purpose of the State Water Control Law.

8. **Section 303(d) List (TMDL) Reopener**
Rationale: Section 303(d) of the Clean Water Act requires the total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it in compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1)of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in the permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

9. **Sludge Reopener**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-220 C for all permits issued to treatment works treating domestic sewage.

10. **Sludge Use and Disposal**
Rationale: VPDES Permit Regulation, 9VAC25-31-100 P; 220 B.2.; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

11. **Water Quality Criteria Monitoring in Attachment A**
Rationale: State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State

waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of this VPDES permit.

12. **Ammonia Nitrogen Removal:**
Rational: In April, 2013 EPA adopted new AQUATIC LIFE AMBIENT WATER QUALITY CRITERIA FOR AMMONIA - FRESHWATER 2013. These criteria are more protective of aquatic life than the existing criteria in the Virginia Water Quality Standards. Although the new EPA criteria have not yet been adopted by Virginia, the wastewater treatment facilities should be designed to consistently achieve compliance with these new EPA criteria

PART II, Conditions Applicable to All Permits
Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes from the previous permit: NA

22. Regulation of Users: 9 VAC 25-31-280 B 9 - NA

23. Public Notice Information required by 9 VAC 25-31-280 B:

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by hand delivery, e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all the persons represented by the commenter/requester. A request for a public hearing must also include; 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit and suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION:
Name: Fred M. Wyatt
Address: DEQ, Southwest Regional Office, 355-A Deadmore Street, Abingdon, VA 24210; Phone: (276) 676-4810 E-mail: frederick.wyatt@deq.virginia.gov Fax: (276) 676-4899

24. Additional Comments:

Previous Board Action:

On March 5, 2015, Buchanan County Public Service Authority (PSA) personnel reported to DEQ's SWRO staff that, due to significant flood damage to the collection system for the Conaway Wastewater Treatment Plant (VA0090531) on March 4 and 5, 2015, no wastewater was entering the Facility. All wastewater normally treated at the 2.0 MGD Facility (average flow of approximately 1.5 MGD) was discharging from the collection system to the Levisa Fork of the Big Sandy River.

On March 24, 2015, PSA staff reported to DEQ staff that water levels in the Levisa Fork had receded to the point that assessment of damage and initial repair work could begin. The PSA reported the events as two overflows, one each for the Levisa Fork (IR No. 2015-S-2240) and Slate Creek (IR No. 2015-S-2239), which is a tributary of Levisa Fork.

The PSA's operating logs indicate that it discharged untreated wastewater from the WWTP's collection system every day from March 4, 2015 until June 22, 2015.

Consequently, a Consent Order was issued by the State Water Control on January 5, 2016 addressing these violations and requiring corrective actions.

Under this Order, the Buchanan County PSA was assessed a civil charge of $21,450.00 in settlement of the violations cited in the Order. The Buchanan County PSA could satisfy $19,305.00 of the civil charge by satisfactorily completing the Supplemental Environmental Project (SEP) described in APPENDIX B of the Order.

APPENDIX A - SCHEDULE OF COMPLIANCE contains an eight item implementation schedule for repair, management, operation, and maintenance of the sewage collection system. APPENDIX B requires a SUPPLEMENTAL ENVIRONMENTAL PROJECT (SEP). The SEP, to be performed by the Buchanan County PSA, consists of the installation of five flow meters near tributaries and other strategic locations throughout Buchanan County's Conaway WWTP collection system, as per the Hach Technical Proposal #091415-01, dated September 14, 2015 and submitted to DEQ by the PSA on September 29, 2015. The cost of the monitoring will be $650 per meter per month. The monitoring contract is for a period of forty eight (48) months. The SEP shall be completed when twelve (12) months of the contract have been fulfilled and all required reports or documents related to the SEP have been submitted to DEQ. See Attachment 8 of this Fact Sheet for details of the Order and ATTACHMENTS A & B.

Staff Comments:

Threatened or Endangered Species: According to the printout from the Virginia Fish and Wildlife Information Service, one state endangered species, variegate darter (Estheostoma variatum) has been identified within a two mile radius in Levisa Fork of the discharge. The issuance of this permit is being coordinated with the Department of Conservation and Recreation (DCR), Department of Game and Inland Fisheries (DGIF), and the US Fish and Wildlife Service (USFS).

Federal Storm Water Regulations: The permittee has complied with the Phase 2 requirements by submitting a VIRGINIA DEQ NO EXPOSURE CERTIFICATION FOR EXCLUSION FROM VPDES STORM WATER PERMITTING.
Permit Fee: The permittee has paid the permit issuance fee of $21,300 for a new major municipal WWTP (Invoice #80793).

Public Comments: None

24. 303(d) listed segments (TMDL): See Item #13, page 2 above.

PLANNING CONCURRENCE FOR MUNICIPAL VPDES PERMIT

PERMIT NO. VA0092916
FACILITY: Big Rock/Conaway WWTP
COUNTY: Buchanan

[N] 1. The discharge is in conformance with the existing planning documents for the area.

[ ] 2. The discharge is not addressed in any planning document but will be included, if required, when the plan is updated.

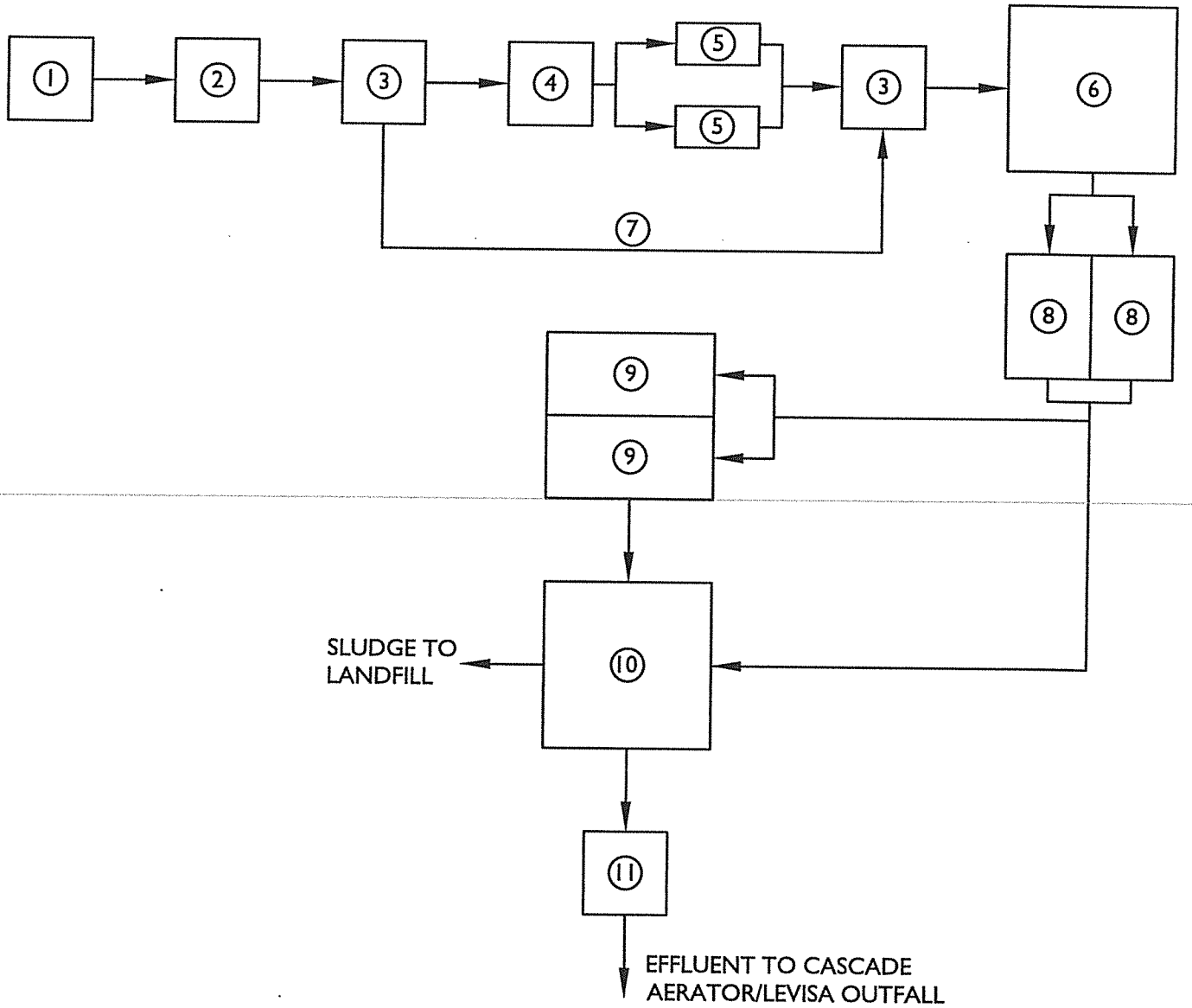
[ ] 3. Other.

Martha Chapman
Date
12 May 2016

ATTACHMENT 1

Treatment Process Diagrams & Description

1. INFLUENT PUMP STATION
2. GRIT REMOVAL/COARSE MECHANICAL SCREENING
3. SPLITTER BOX
4. FINE MECHANICAL SCREENING
5. MBBR
6. BALLASTED SEDIMENTATION
7. WET WEATHER BLENDED FLOW
8. SECONDARY CLARIFIERS
9. AEROBIC DIGESTERS
10. WWTP CONTROL BUILDING/UV/SOLIDS PRESS
11. AERATION



DESIGNED BY	SCALE	NOT TO SCALE
DRAWN BY	DATE	FEBRUARY 2016
PROJECT NO.	11084-03	

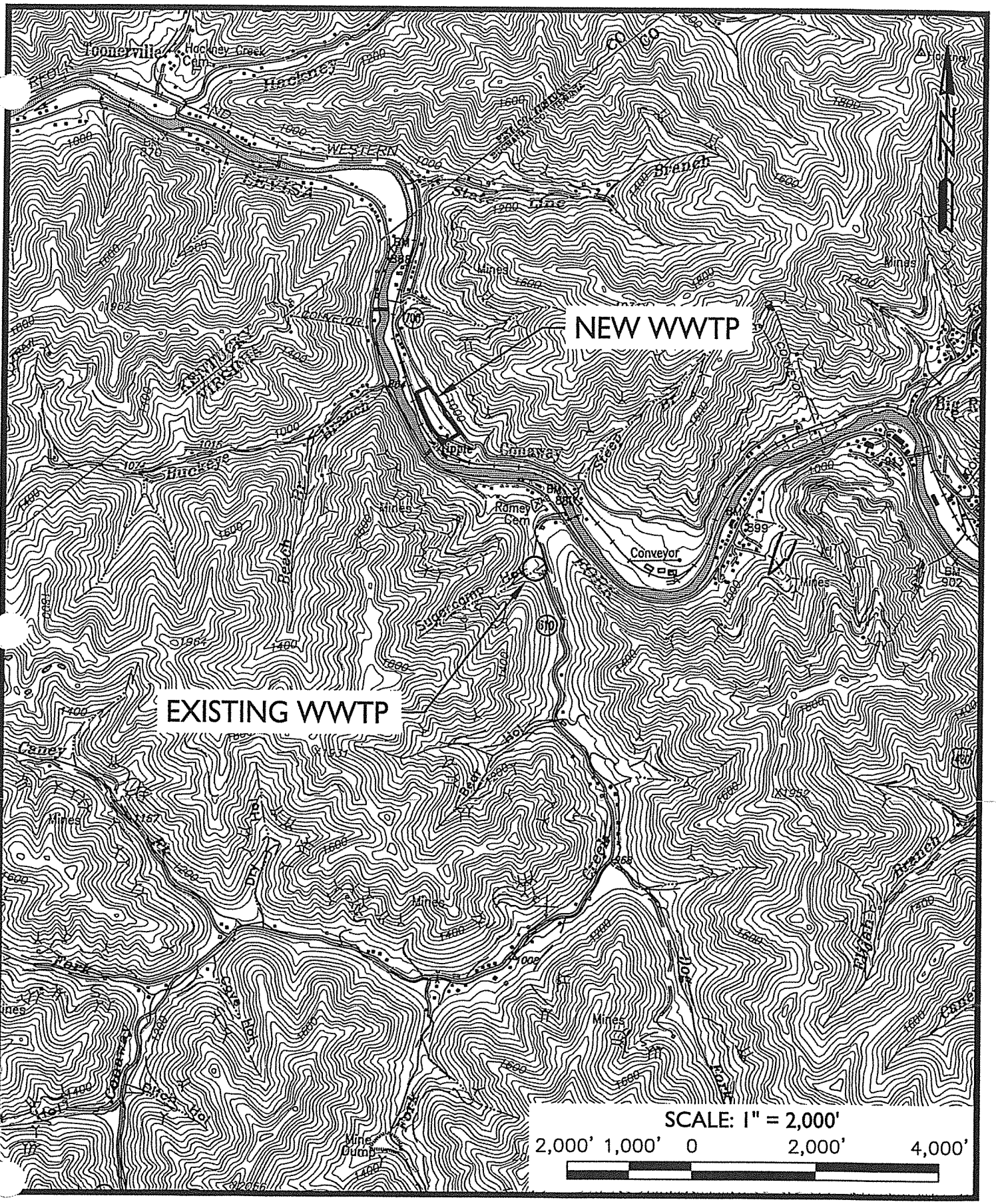
WASTEWATER COLLECTION AND TREATMENT FACILITIES EVALUATION
FOR THE
BUCHANAN COUNTY PUBLIC SERVICE AUTHORITY
MBBR AND BALLISTED SEDIMENTATION FLOW SCHEMATIC

THOMPSON & LITTON

SHEET
EXHIBIT
1

ATTACHMENT 2

Topographic Map

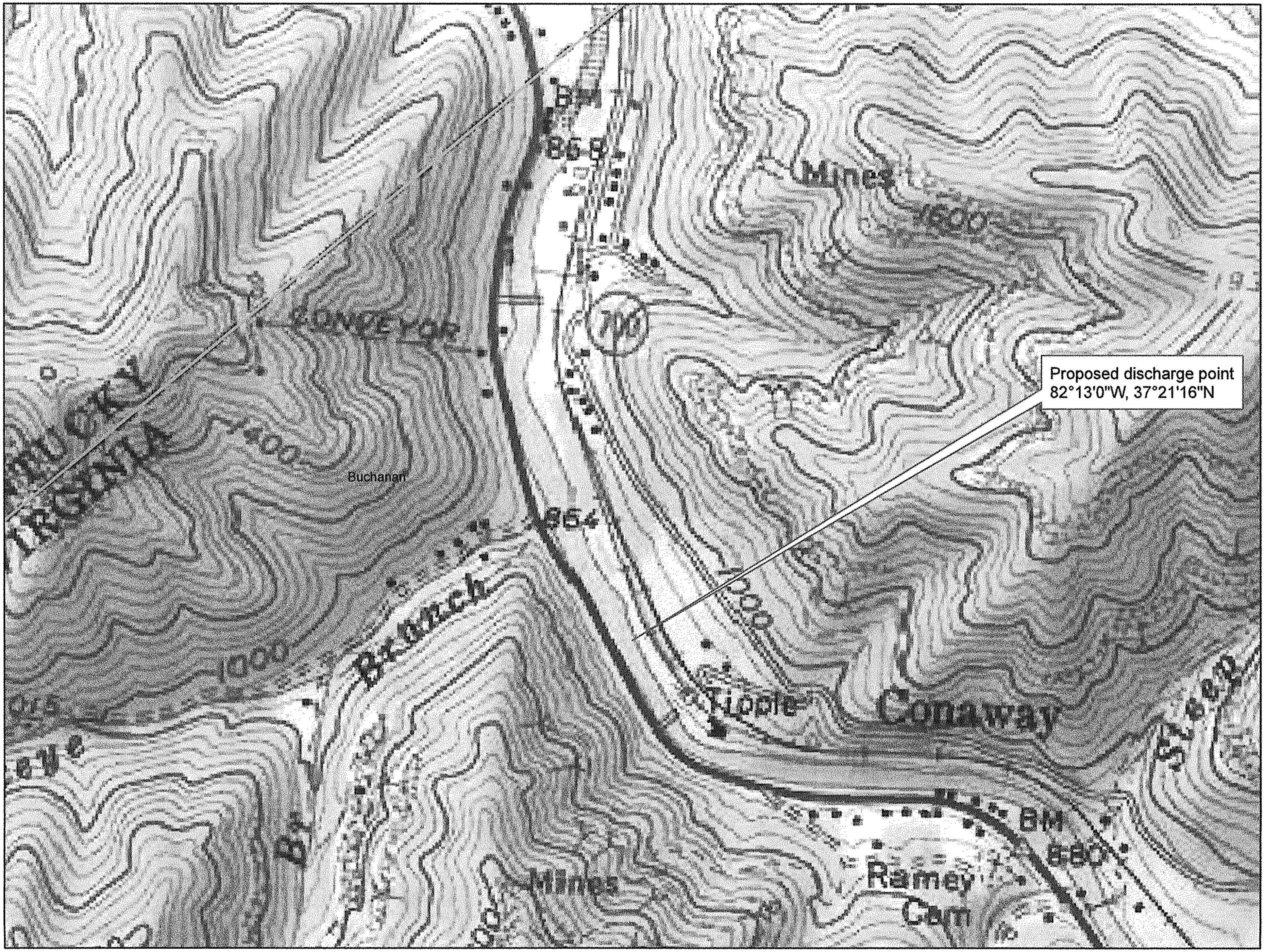


DESIGNED BY	SCALE: 1" = 2,000'
DRAWN BY	DATE: MAY 2015
PROJECT NO.: 11048-03	

BIG ROCK/CONAWAY WASTEWATER TREATMENT PLANT
FOR THE
BUCHANAN COUNTY PUBLIC SERVICE AUTHORITY
LOCATION MAP

THOMPSON & LITTON

SHEET
EXHIBIT
1


Proposed discharge point
82°13'0"W, 37°21'16"N
Buchanan
Mines
Conaway
Tipple
Branch
Ramey
Cem
BM
880
864
1000
700

ATTACHMENT 3

Permit Limitations Development

Stream Flows for Levisa Fork

Gage: Levisa Fork at Big Rock # 3207800

Lat: 37° 21' 13" Long 82° 11' 44"

DA = 297 mi.²

1 Q10 = 11 cfs = 7.1 MGD
HF1Q10 = 41 cfs = 26.5 MGD

7Q10 = 13 cfs = 8.4 MGD
HF 7Q10 = 56 cfs = 36.2 MGD

30 Q10 = 18 cfs = 11.6 MGD
HF 30Q10 = 124 cfs = 80.2 MGD

Harmonic Mean = 90 cfs = 58.2 MGD

DA of Conaway Creek just upstream of existing discharge = 7.52 mi.²

Additional DA of Levisa Fork from gage to new discharge point = 1.18 mi.²

Total drainage Area of New Discharge Point =
DA-Total = (297 + 7.52 + 1.18) mi.² = 305.7 mi.²

Stream Flows for Levisa Fork

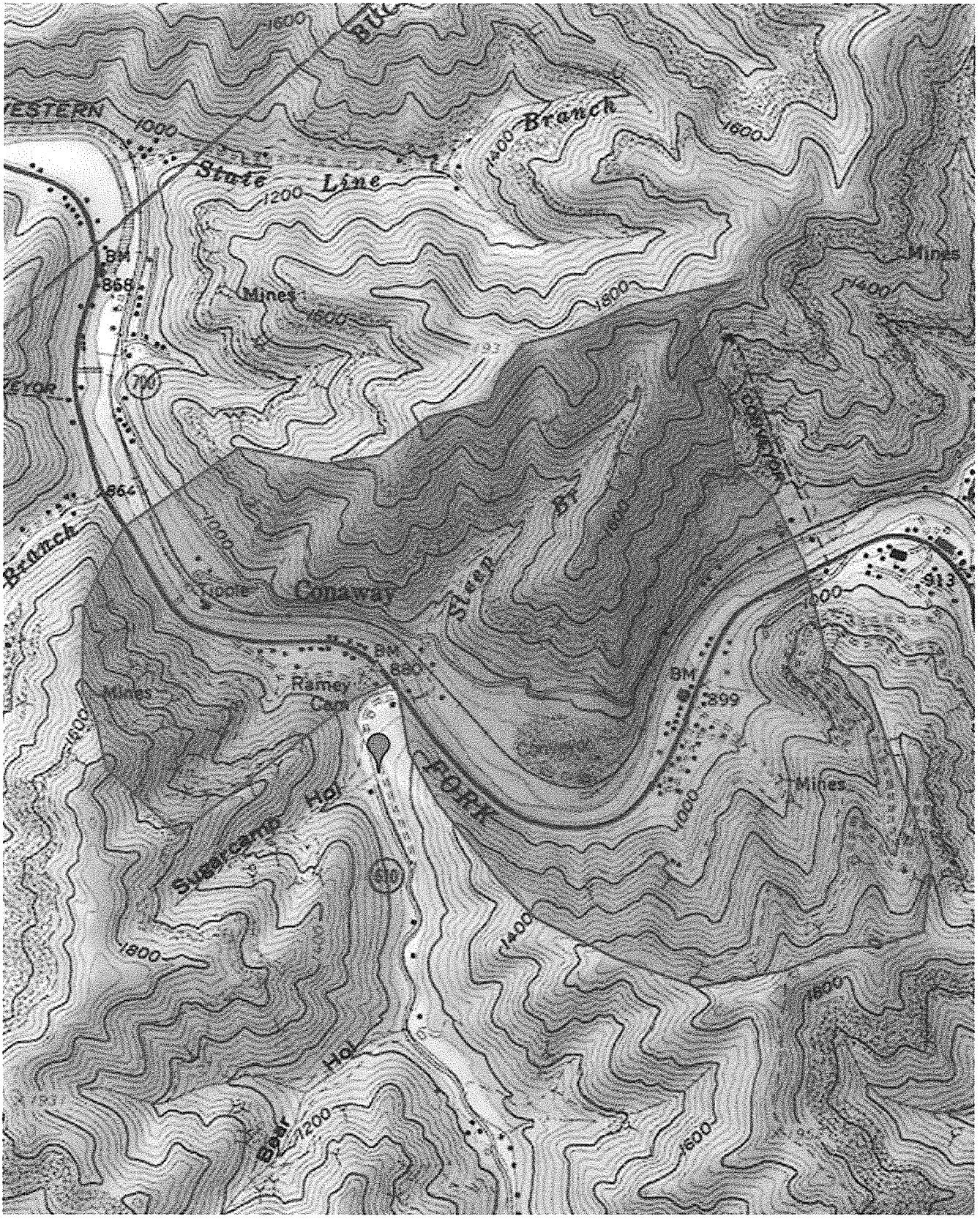
Adjusted Flows at New Discharge Point:

1Q10 = (305.7/297)(7.1 MGD) = 7.3 MGD
HF1Q10 = (305.7/297)(26.5 MGD) = 27.3 MGD

7Q10 = (305.7/297)(8.4 MGD) = 8.6 MGD
HF 7Q10 = (305.7/297)(36.2 MGD) = 37.3 MGD

30Q10 = (305.7/297)(11.6 MGD) = 12.0 MGD
HF 30Q10 = (305.7/297)(80.2 MGD) = 82.5 MGD

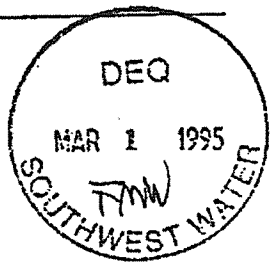
Harmonic Mean = (305.7/297)(58.2 MGD) = 60.0 MGD


State Line
Branch
Mines
Conaway
Ramey Cem
FORK
Hol
Bear
BM 868
BM 880
BM 899
913
1600
1400
1200
1000
1800

1.18 mi.²

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Water Quality Assessments and Planning
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240



SUBJECT: Flow Frequency Determination
Conaway WWTP - #VA0067822

TO: Charles Gates, SWRO

FROM: Paul Herman, OWRM-WQAP

DATE: February 28, 1995

COPIES: Ron Gregory, Charles Martin, Dale Phillips, Curt Wells, File

The Conaway WWTP discharges to Conaway Creek near Conaway, VA. Stream flow frequencies are required at this site by the permit writer for the purpose of calculating effluent limitations for the VPDES permit.

The USGS operated a continuous record gage on Conaway Creek approximately 1000 feet upstream of the Conaway WWTP discharge point. The gage was in operation from July 1974 through December 1975. The data collected by the USGS at the Conaway Creek gage correlated very well with the same day daily mean values from the Levisa Fork at Big Rock gage. Low daily mean flows from the Conaway Creek hydrograph were plotted on a logarithmic graph against the same day daily mean flows for the continuous record gage on the Levisa Fork at Big Rock, VA. A best fit line was drawn through the points and the required flow frequencies from the Big Rock gage were plotted on the regression line so the associated flow frequencies at the Conaway gage could be determined from the graph.

The flow frequencies at the discharge point were determined by using the values at the Conaway gage and adjusting them by proportional drainage areas. The data for the Big Rock gage, the Conaway gage and the discharge point are presented below:

Levisa Fork at Big Rock, VA (#03207800):

Drainage Area = 297 mi^2

1Q10 = 9.3 cfs = 6.0 MGD		High Flow 1Q10 = 21 cfs = 13.6 MGD	
7Q10 = 11 cfs = 7.1 MGD		High Flow 7Q10 = 32 cfs = 20.7 MGD	
30Q5 = 22 cfs = 14.2 MGD		HM = 85 cfs = 54.9 MGD	

Conaway Creek at Conaway, VA (#03207805):

Drainage Area = 7.4 mi^2

1Q10 = 0.79 cfs		High Flow 1Q10 = 1.33 cfs	
7Q10 = 0.88 cfs		High Flow 7Q10 = 1.75 cfs	
30Q5 = 1.37 cfs		HM = 3.28 cfs	

Conaway Creek at Conaway WWTP discharge point:

Drainage Area = 7.52 mi^2

1Q10 = 0.80 cfs	High Flow 1Q10 = 1.35 cfs
7Q10 = 0.89 cfs	High Flow 7Q10 = 1.78 cfs
30Q5 = 1.39 cfs	HM = 3.33 cfs

The high flow months are December through May. This analysis assumes there are no significant discharges, withdrawals or springs influencing the flow in the Conaway Creek upstream of the discharge point.

If there are any questions concerning this analysis, please let me know.

Calculation of Total Ammonia Nitrogen Limits

Facility Name: Big Rock/Conaway WWTP
VPDES Permit No:
Stream Name: Lewisa Fork
Stream Tier Designation: I

NH_3-N limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human Health standards are not applicable for ammonia.

The following stream parameter values are being used for the calculations. The dry season is June - November and the wet season is December - May.

Dry Season pH = 8.2 Dry Season Temperature (deg.C) = 24
Wet Season pH = 8.2 Wet Season Temperature (deg.C) = 14

The ammonia nitrogen water quality standards (WQS) are:

Acute: AC_{dry} = 5.72 AC_{wet} = 5.72

Chronic: CC_{dry} = 0.973 CC_{wet} = 1.79

The following flows apply:

Q_e = Design Flow of STP(MGD) = 2.7 MGD
Q_{s-1} = 1Q10 Flow (MGD) = 7.3 MGD
Q_{s-1w} = 1Q10 High Flow (MGD) = 27.3 MGD
Q_{s-30} = 30Q10 Flow (MGD) = 12.0 MGD
Q_{s-30w} = 30Q10 High Flow (MGD) = 82.5 MGD

The water quality wasteload allocations (WLAs) are calculated as follows:

f = fraction of stream flow to use from MIX Program

Acute:

$$\text{Dry } WLA_a = AC_{dry}[(f)Q_{s-1} + Q_e) - (f)(Q_{s-1})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Dry } WLA_a = 5.72[(1)7.3 + 2.7) - ( )( )(0)] / (2.7) \text{ mg/l}$$
$$\text{Dry } WLA_a = 21.2 \text{ mg/l}$$

$$\text{Wet } WLA_a = AC_{wet}[(f)Q_{s-1w} + Q_e) - (f)(Q_{s-1w})(NH_3\text{-N background})] / (Q_e) \text{ mg/l}$$
$$\text{Wet } WLA_a = 5.72[(1)27.3 + 2.7) - ( )( )(0)] / (2.7) \text{ mg/l}$$
$$\text{Wet } WLA_a = 63.6 \text{ mg/l}$$

Chronic:

$$\text{Dry } WLA_c = CC_{dry}[(f)Q_{s-30} + Q_e) - (f)(Q_{s-30})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Dry } WLA_c = 0.973[(1)12.0 + 2.7) - ( )( )(0)] / (2.7) \text{ mg/l}$$
$$\text{Dry } WLA_c = 5.3 \text{ mg/l}$$

$$\text{Wet } WLA_c = CC_{wet}[(f)Q_{s-30w} + Q_e) - (f)(Q_{s-30w})(NH_3\text{-N background})] / (Q_e)$$
$$\text{Wet } WLA_c = 1.79[(1)82.5 + 2.7) - ( )( )(0)] / (2.7) \text{ mg/l}$$
$$\text{Wet } WLA_c = 56.5 \text{ mg/l}$$

Station ID	Collection Date Time	Temp Celcius	Field Ph
6ALEV131.52	02/23/2010 11:40	7	8.2
	04/26/2010 13:10	15.2	8
	06/09/2010 09:25	20.2	7.8
	08/16/2010 11:30	27.8	8.2
	10/21/2010 12:00	12.7	8.2
	01/31/2011 11:40	5.1	8.2
	03/29/2011 12:35	7.4	8.4
	05/18/2011 12:00	11.8	8.1
	07/13/2011 11:30	24	8.1
	09/01/2011 12:10	24.8	8.2
	11/01/2011 11:50	7.7	8.2
	01/19/2012 12:30	4	7.8
	03/12/2012 11:20	9.4	8
	05/03/2012 11:00	19.2	8.1
	07/31/2012 11:20	24.5	8.4
	09/25/2012 11:30	14.9	8.1
	11/07/2012 11:40	8.7	7.7
	02/27/2013 13:20	7.62	~~10.42~~
	04/23/2013 12:40	12.85	8.08
	06/06/2013 11:50	19.9	8.1
	08/06/2013 14:00	25.2	8.63
	10/17/2013 13:30	18.94	8.37
	12/19/2013 12:15	4.34	8.05
	02/27/2014 12:45	3.34	8.33
	04/09/2014 14:00	11.49	8.21
	06/26/2014 14:00	26.15	8.52
	08/27/2014 13:45	24.05	8.46
	10/30/2014 13:30	12.54	8.47 - 90th percentile dry
	12/30/2014 13:15	6.97	7.86
	02/10/2015 12:15	5.73	8.13
	04/08/2015 13:15	13.7	8.49
	05/18/2015 12:15	21.97	8.39 - 90th percentile wet
	06/09/2015 12:45	23.87	8.2
	06/09/2015 13:00	24	8.21
	06/15/2015 12:15	26.19	8.29
	06/22/2015 12:00	25.2	8.32
	08/03/2015 12:30	25.06	8.41
	10/13/2015 14:00	18.51	8.4
	12/07/2015 13:00	5.79	8.03
	02/01/2016 12:30	7.24	7.96

} Use year round pH of 8.47

Effluent pH = 7.2

Acute mix pH = $[7.2(2.7) + 8.47(7.3)] / 10 = 8.1$

Chronic mix pH = $[7.2(2.7) + 8.47(12)] / 14.7 = 8.2$

Use year round pH of 8.2

4/13/2016 2:10:57 PM

Facility = Big Rock/Conaway WWTP June - November
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 21.2
WLAc = 5.3
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 10
Variance = 36
C.V. = 0.6
97th percentile daily values = 24.3341
97th percentile 4 day average = 16.6379
97th percentile 30 day average= 12.0605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 10.6936514951064
Average Weekly limit = 7.82180401525354 ≈ 7.8 mg/l
Average Monthly LImit = 5.82622164538878 ≈ 5.8 mg/l

The data are:

10

From the WLAs, it is obvious that an ammonia limit is not needed in the months of December - May.

Calculation of Total Ammonia Nitrogen Limits

Facility Name: Big Rock / Conaway WWTP
VPDES Permit No:
Stream Name: Levisa Fork
Stream Tier Designation: I

NH_3-N limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human Health standards are not applicable for ammonia.

The following stream parameter values are being used for the calculations. The dry season is June- November and the wet season is December- May.

Dry Season pH = 8.2 Dry Season Temperature (deg.C) = 24
Wet Season pH = 8.2 Wet Season Temperature (deg.C) = 14

The ammonia nitrogen water quality standards (WQS) are: (2013 EPA Criteria)

Acute: AC_{dry} = 1.9 AC_{wet} = 4.4

Chronic: CC_{dry} = 0.44 CC_{wet} = 0.84

The following flows apply:

Q_e = Design Flow of STP (MGD) = 2.7 MGD
Q_{s-1} = 1Q10 Flow (MGD) = 7.3 MGD
Q_{s-1w} = 1Q10 High Flow (MGD) = 27.3 MGD
Q_{s-30} = 30Q10 Flow (MGD) = 12.0 MGD
Q_{s-30w} = 30Q10 High Flow (MGD) = 82.5 MGD

The water quality wasteload allocations (WLAs) are calculated as follows:

f = fraction of stream flow to use from MIX Program

Acute:

Dry WLA_a = $[AC_{dry}((f)Q_{s-1} + Q_e) - (f)(Q_{s-1})(NH_3\text{-N background})] / (Q_e)$ mg/l
Dry WLA_a = [1.9 [(1) 7.3 + 2.7) - ( )( )( )] / (2.7) mg/l
Dry WLA_a = 7.0 mg/l

Wet WLA_a = $[AC_{wet}((f)Q_{s-1w} + Q_e) - (f)(Q_{s-1w})(NH_3\text{-N background})] / (Q_e)$ mg/l
Wet WLA_a = [4.4 [(1) 27.3 + 2.7) - ( )( )( )] / (2.7) mg/l
Wet WLA_a = 48.9 mg/l

Chronic:

Dry WLA_c = $[CC_{dry}((f)Q_{s-30} + Q_e) - (f)(Q_{s-30})(NH_3\text{-N background})] / (Q_e)$
Dry WLA_c = [0.44 [(1) 12.0 + 2.7) - ( )( )( )] / (2.7) mg/l
Dry WLA_c = 2.4 mg/l

Wet WLA_c = $[CC_{wet}((f)Q_{s-30w} + Q_e) - (f)(Q_{s-30w})(NH_3\text{-N background})] / (Q_e)$
Wet WLA_c = [0.84 [(1) 82.5 + 2.7) - ( )( )( )] / (2.7) mg/l
Wet WLA_c = 26.5 mg/l

4/12/2016 9:52:41 AM

Facility = Big Rock/Conaway WWTP, EPA, Dry
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 7
WLAc = 2.4
Q.L. = 0.2
# samples/mo. = 20
# samples/wk. = 5

Summary of Statistics:

observations = 1
Expected Value = 10
Variance = 36
C.V. = 0.6
97th percentile daily values = 24.3341
97th percentile 4 day average = 16.6379
97th percentile 30 day average= 12.0605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 4.84240822419915
Average Weekly limit = 3.15607984774178 ≈ 3.2 mg/l
Average Monthly LImit = 2.49215395434375 ≈ 2.5 mg/l

The data are:

10

4/12/2016 9:55:29 AM

Facility = Big Rock/Conaway WWTP, EPA Wet
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 48.9
WLAc = 26.5
Q.L. = 0.2
# samples/mo. = 20
# samples/wk. = 5

Summary of Statistics:

observations = 1
Expected Value = 10
Variance = 36
C.V. = 0.6
97th percentile daily values = 24.3341
97th percentile 4 day average = 16.6379
97th percentile 30 day average= 12.0605
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

10

MODEL FILE AND STREAM INSPECTION REPORT FORM

Discharge Name: Big Rock / Conaway WWTP

Location: Rt. 780, near Conaway, Buchanan Co.

Model File Path/Name: _____

Inspection Date: 1 / 1 **Modeler:** Fred Wyatt

General Stream Information:

Stream Name: Levisa Fork

Basin: Tennessee - ~~Big Sandy River~~ Big Sandy River Section: 3 Class: IV Special Standards: None

Are the standards for this stream violated due to natural causes? (Y/N) N

Is the stream correctly classified? (Y/N) Y

If "N", what is the correct classification? _____

Model Segmentation:

Number of segments to be modeled: 1

Flow Gauge / Flow Frequency Information (Attach Copy):

Gauge Used: Levisa Fork at Big Rock, # 3207800

Drainage Area/Observed Flow At The Gauge:	297	sq. mi./mgd
Drainage Area/Observed Flow At The Start of The Model:	305.7	sq. mi./mgd
7Q10 of the Gauge:	8.4	mgd
Flow Adjustment for Springs or Dischargers:	0	mgd

Background Water Quality:

Elevation at the Start of the model: 853 ft above mean sea level

Elevation at the End of the model: 828 ft above mean sea level

Critical Temperature: 24 °C (attach data and analysis)

Ambient Monitoring Gauge Used: _____

Additional Discharges Information:

Is there a discharger within 3 miles upstream of the proposed discharge? (Y/N) N

Does antidegradation apply to this analysis? (Y/N) N If so, which segment(s)? _____

Is any segment on the current 303(d) list for D.O. violations? (Y/N) N

Is any segment of the model within an approved D.O. TMDL segment? (Y/N) N

Is any discharge to the model intermittent? (Y/N) N

Any dams in stream section being modeled? (Y/N) N

Notes/Sketch:

MODEL FILE AND STREAM INSPECTION REPORT FORM

(Fill In This Page FOR EACH SEGMENT To Be Modeled)

Segment Number:		1
Reason for Defining Segment:	Discharge at Beginning of Segment	X
	Physical Change at Beginning of Segment	
	Tributary at Beginning of Segment	

Length of Segment (mi.):	1.0
Drainage Area at Start of Segment (sq. mi.):	306.7
Drainage Area at End of Segment (sq. mi.):	311
Elevation at Start of Segment (ft.):	853
Elevation at End of Segment (ft.):	840

If Discharge or Tributary At Beginning of Segment, Complete the Following:

Discharge/Tributary Name:	Big Rock/Conaway WWTP	
Discharge/Tributary Temperature (C): (If different from background ambient)		21
Critical Discharge/Tributary Flow (mgd): (Design/Permitted Flow or 7Q10 Condition) (use permitted or design flow for discharges, 7Q10 flow from flow frequency analysis for tributaries)		2.7
For Dischargers Only: (use permitted Concentrations)	**$CBOD_5$ (mg/l):**	25
	TKN (mg/l):	8.8
	D.O. (mg/l):	6

General Type of Cross Section in Segment: (7Q10 Condition)

Rectangular X Triangular ___ Deep Narrow U ___ Wide Shallow Arc ___ Irregular ___ No Defined Channel ___

General Channel Characteristics of Segment: (7Q10 Condition)

Mostly Straight X Moderately Meandering ___ Severely Meandering ___ No Defined Channel ___

Does the stream have a pool and riffle character (Y/N)? (7Q10 Condition)						Y
If "Y":	% of length that is pools 75				Average depth of pools (ft) ___	
	% of length that is riffles 25				Average depth of riffles (ft) ___	
Bottom:	Sand ___	Silt ___	Gravel ___	Small Rock ___	Large Rock X	Boulders ___
Sludge Deposits:	None X	Trace ___	Light ___	Heavy ___		
Plants:	Rooted:	None X	Few ___	Light ___	Heavy ___	
	Algae:	None X	Film on Edges Only ___		Film on Entire Bottom ___	

Projected 7Q10 Width of Segment (ft): (must be projected by modeler based on site visit)	80
Projected 7Q10 Depth of Segment (ft): (can be calculated by model based on width)	
Projected 7Q10 Velocity of Segment (ft): (can be calculated by model based on width)	
Does the water have an evident green color? (Y/N)	

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to LEVISA FORK.

File Information

File Name:	C:\Users\jjc93887\Documents\FREDWORK\Big Rock Conaway.llmod.m
Date Modified:	April 14, 2016

Water Quality Standards Information

Stream Name:	LEVISA FORK
River Basin:	Tennessee/Big Sandy Rivers Basin
Section:	3
Class:	IV - Mountainous Zones Waters
Special Standards:	None

Background Flow Information

Gauge Used:	Levisa Fork at Big Rock
Gauge Drainage Area:	297 Sq.Mi.
Gauge 7Q10 Flow:	8.4 MGD
Headwater Drainage Area:	305.7 Sq.Mi.
Headwater 7Q10 Flow:	8.646061 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	0 MGD
Incremental Flow in Segments:	2.828283E-02 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	24 Degrees C
Background cBOD5:	2 mg/l
Background TKN:	0 mg/l
Background D.O.:	7.398752 mg/l

Model Segmentation

Number of Segments:	1
Model Start Elevation:	853 ft above MSL
Model End Elevation:	828 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to LEVISA FORK.

Segment Information for Segment 1

Definition Information

Segment Definition:	A discharge enters.
Discharge Name:	BIG ROCK/CONAWAY WWTP
VPDES Permit No.:	

Discharger Flow Information

Flow:	2.7 MGD
cBOD5:	25 mg/l
TKN:	8.8 mg/l
D.O.:	6 mg/l
Temperature:	21 Degrees C

Geographic Information

Segment Length:	1.5 miles
Upstream Drainage Area:	305.7 Sq.Mi.
Downstream Drainage Area:	0 Sq.Mi.
Upstream Elevation:	853 Ft.
Downstream Elevation:	828 Ft.

Hydraulic Information

Segment Width:	80 Ft.
Segment Depth:	0.491 Ft.
Segment Velocity:	0.447 Ft./Sec.
Segment Flow:	11.346 MGD
Incremental Flow:	-8.646 MGD (Applied at end of segment.)

Channel Information

Cross Section:	Rectangular
Character:	Mostly Straight
Pool and Riffle:	Yes
Percent Pools:	75
Percent Riffles:	25
Pool Depth:	0.49 Ft.
Riffle Depth:	0.35 Ft.
Bottom Type:	Small Rock
Sludge:	None
Plants:	None
Algae:	None

"Model Run For C:\Users\jjc93887\Documents\FREDWORK\Big Rock Conaway.IImod.mod On 4/14/2016 1:25:28 PM"

"Model is for LEVISA FORK."
"Model starts at the BIG ROCK/CONAWAY WWTP discharge."

"Background Data"

"7Q10"	"cBOD5"	"TKN"	"DO"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
8.6461,	2,	0,	7.399,	24

"Discharge/Tributary Input Data for Segment 1"

"Flow",	"cBOD5",	"TKN",	"DO",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
2.7,	~~25~~, 30 BOD5	8.8,	6, 5.8 NH3N	21

"Hydraulic Information for Segment 1"

"Length",	"Width",	"Depth",	"Velocity"
"(mi)",	"(ft)",	"(ft)",	"(ft/sec)"
1.5,	80,	.491,	.447

"Initial Mix Values for Segment 1"

"Flow",	"DO",	"cBOD",	"nBOD",	"DOSat",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
11.3461,	7.066,	18.683,	5.976,	8.324,	23.2861

"Rate Constants for Segment 1. - (All units Per Day)"

"k1",	"k1@T",	"k2",	"k2@T",	"kn",	"kn@T",	"BD",	"BD@T"
1,	1.163,	10,	10.811,	.4,	.515,	0,	0

"Output for Segment 1"
"Segment starts at BIG ROCK/CONAWAY WWTP"

"Total"	"Segm."			
"Dist."	"Dist."	"DO",	"cBOD",	"nBOD"
"(mi)",	"(mi)",	"(mg/l)",	"(mg/l)",	"(mg/l)"
0,	0,	7.066,	18.683,	5.976
.1,	.1,	6.926,	18.388,	5.934
.2,	.2,	6.81,	18.098,	5.892
.3,	.3,	6.714,	17.813,	5.851
.4,	.4,	6.636,	17.532,	5.81
.5,	.5,	6.573,	17.255,	5.769
.6,	.6,	6.523,	16.983,	5.729
.7,	.7,	6.484,	16.715,	5.689
.8,	.8,	6.455,	16.451,	5.649
.9,	.9,	6.434,	16.192,	5.609
1,	1,	6.42,	15.937,	5.57
1.1,	1.1,	6.412,	15.686,	5.531
1.2,	1.2,	6.409,	15.439,	5.492
1.3,	1.3,	6.41,	15.195,	5.453
1.4,	1.4,	6.415,	14.955,	5.415
1.5,	1.5,	6.423,	14.719,	5.377

"END OF FILE"

ATTACHMENT 4

Metals Specific Target Values for Water Quality Criteria Monitoring

		HARDNESS	150.00
ACUTE	COPPER ug/l	WQSACUTE	19.7
CHRONIC		WQSCHRONIC	12.7
		HARDNESS	150.00
ACUTE	LEAD ug/l	WQSACUTE	199.25
CHRONIC		WQSCHRONIC	22.64
		HARDNESS	150.00
ACUTE	ZINC ug/l	WQSACUTE	168.93
CHRONIC		WQSCHRONIC	168.93
		HARDNESS	150.00
ACUTE	CADMIUM ug/l	WQSACUTE	6.20
CHRONIC		WQSCHRONIC	1.56
		HARDNESS	150.00
ACUTE	CHROMIUM III ug/l	WQSACUTE	794.17
CHRONIC		WQSCHRONIC	103.31
		HARDNESS	150.00
ACUTE	NICKEL ug/l	WQSACUTE	256.98
CHRONIC		WQSCHRONIC	28.56
		HARDNESS	150.00
ACUTE	SIVER ug/l	WQSACUTE	6.93

Big Rock / Conaway WWTP

WLA formula = chronic standard (7Q10 + effluent flow) / effluent flow

Antimony: WLA = 640 (8.6 + 2.7) / 2.7 ug/l = ~~2679~~ 500 ug/l

Arsenic: WLA = 150 (8.6 + 2.7) / 2.7 ug/l = ~~628~~ 500 ug/l

Cadmium: WLA = 1.56 (8.6 + 2.7) / 2.7 ug/l = 6.5 ug/l

Chromium III: WLA = 103.31 (8.6 + 2.7) / 2.7 ug/l = ~~432~~ 400 ug/l

Chromium VI: WLA = 11 (8.6 + 2.7) / 2.7 ug/l = 46 ug/l

Copper: WLA = 12.7 (8.6 + 2.7) / 2.7 ug/l = 53 ug/l

Lead: WLA = 22.64 (8.6 + 2.7) / 2.7 ug/l = 95 ug/l

Mercury: WLA = 0.77 (8.6 + 2.7) / 2.7 ug/l = 3.2 ug/l

Selenium: WLA = 5.0 (8.6 + 2.7) / 2.7 ug/l = 21 ug/l

Silver: WLA = 6.93 (7.3 + 2.7) / 2.7 ug/l = 26 ug/l

Zinc: WLA = 168.93 (8.6 + 2.7) / 2.7 ug/l = ~~710~~ 500 ug/l

Nickel: WLA = 28.56 (8.6 + 2.7) / 2.7 ug/l = ~~120~~ 100 ug/l

ATTACHMENT 5

Whole Effluent Toxicity Analysis

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 12/13/13
File: WETLIM10.xls
(MIX.EXE required also)

Enter data in the cells with blue type:

Entry Date:	04/20/16
Facility Name:	Big Rock/Conaway WWTF
VPDES Number:	VA0092916
Outfall Number:	1

Plant Flow:	2.7	MGD
Acute 1Q10:	7.3	MGD
Chronic 7Q10:	8.6	MGD

Acute Endpoint/Permit Limit — **Use as LC_{50} in Special Condition, as TUa on DMR**

ACUTE	100% =	NOAEC	LC_{50} =	NA	% Use as	NA TUa
ACUTE WLAa		1.11111111	Note: Inform the permittee that if the mean of the data exceeds			
			this TUa:	1.0	a limit may result using STATS.EXE	

Chronic Endpoint/Permit Limit — **Use as NOEC in Special Condition, as TUc on DMR**

CHRONIC	6.1211459	TU_c	NOEC =	17	% Use as	5.88	TU_c
BOTH*	11.1111114	TU_c	NOEC =	9	% Use as	11.11	TU_c
AML	6.1211459	TU_c	NOEC =	17	% Use as	5.88	TU_c

ACUTE WLAa,c	11.1111111	Note: Inform the permittee that if the mean	
CHRONIC WLAc	4.18518519	of the data exceeds this TUc:	2.51545229
* Both means acute expressed as chronic		a limit may result using STATS.EXE	

% Flow to be used from MIX.EXE

Acute	100	%	
Chronic	100	%	

Diffuser /modeling study?

Enter Y/N	n	
Acute	1	:1
Chronic	1	:1

Are data available to calculate CV? (Y/N)	N	(Minimum of 10 data points, same species, needed)
Are data available to calculate ACR? (Y/N)	N	(NOEC<LC50, do not use greater/less than data)

Go to Page 2
Go to Page 3

IWC_a	27 %	Plant flow/plant flow + 1Q10
IWC_c	23.89380531 %	Plant flow/plant flow + 7Q10

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

Dilution, acute	3.703703704	100/IWCa
Dilution, chronic	4.185185185	100/IWCc

WLA_a	1.111111111	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	4.185185185	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	11.11111111	ACR X's WLA_a - converts acute WLA to chronic units

ACR -acute/chronic ratio		10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation		0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants	eA	0.4109447	Default = 0.41
	eB	0.6010373	Default = 0.60
	eC	2.4334175	Default = 2.43
	eD	2.4334175	Default = 2.43 (1 samp)

No. of sample: 1

****The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.**

$LTA_{a,c}$	4.566052222	WLAa,c X's eA				
LTA_c	2.515452404	WLAc X's eB				
MDL** with $LTA_{a,c}$	11.11111138	TU_c	NOEC =	9.000000	(Protects from acute/chronic toxicity)	
MDL** with LTA_c	6.1211459	TU_c	NOEC =	16.336810	(Protects from chronic toxicity)	
AML with lowest LTA	6.1211459	TU_c	NOEC =	16.336810	Lowest LTA X's eD	

Rounded NOEC's		
NOEC =	9	%
NOEC =	17	%
NOEC =	17	

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

MDL with $LTA_{a,c}$	1.111111138	TU_a	LC50 =	89.999998	%	
MDL with LTA_c	0.61211459	TU_a	LC50 =	163.368104	%	Use NOAEC=100%

Rounded LC50's		
LC50 =	90	%
LC50 =	NA	

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847

δ = 0.554513029

Using the log variance to develop eA
(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -0.88929666

eA = 0.410944686

Using the log variance to develop eB
(P. 100, step 2b of TSD)

δ_4^2 = 0.086177696

δ_4 = 0.293560379

B = -0.50909823

eB = 0.601037335

Using the log variance to develop eC
(P. 100, step 4a of TSD)

δ^2 = 0.3074847

δ = 0.554513029

C = 0.889296658

eC = 2.433417525

Using the log variance to develop eD
(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.3074847

δ_n = 0.554513029

D = 0.889296658

eD = 2.433417525

	Vertebrate IC_{25} Data		Invertebrate IC_{25} Data	
	or		or	
	LC_{50} Data	LN of data	LC_{50} Data	LN of data
	**********		**********	
1			1	
2			2	
3			3	
4			4	
5			5	
6			6	
7			7	
8			8	
9			9	
10			10	
11			11	
12			12	
13			13	
14			14	
15			15	
16			16	
17			17	
18			18	
19			19	
20			20	
St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA NEED DATA
Mean	0	0	Mean	0 0
Variance	0	0.000000	Variance	0 0.000000
CV	0		CV	0

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring		Limit	
	% Effluent	TUc	% Effluent	TUc
Dilution series based on data mean	39.8	2.515452		
Dilution series to use for limit			17	5.8823529
Dilution factor to recommend:	0.63051		0.4123106	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	63.1	1.59	41.2	2.43
	39.8	2.52	17.0	5.88
	25.1	3.99	7.0	14.27
	15.80	6.33	2.9	34.60
Extra dilutions if needed	9.96	10.04	1.2	83.92
	6.28	15.92	0.5	203.54

Table 3. Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50, enter it here: NO DATA %LC_{50} NO DATA TUa

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUa. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C138
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

ATTACHMENT 6

303 (d) Fact Sheets

TMDL

Wyatt, Frederick (DEQ)

From: Frazier, Teresa (DEQ)
Sent: Monday, March 07, 2016 11:04 AM
To: Wyatt, Frederick (DEQ)
Subject: FW: Levisa at Conaway
Attachments: Levisa_hardness.xls

6ALEV130.63

From: Frazier, Teresa (DEQ)
Sent: Thursday, March 03, 2016 8:41 AM
To: Wyatt, Frederick (DEQ)
Subject: Levisa at Conaway

Fred,
Attached is the information you requested for the Conaway area of Levisa Fork.
The stream segment of interest on the TMDL Factsheet is VAS-Q08R_LEV01A00. There are three completed TMDLs.

I threw in hardness for a bonus prize.

Teresa Frazier
DEQ Southwest Regional Office | 276.676.4805 | Teresa.Frazier@deq.virginia.gov
355-A Deadmore Street, Abingdon, VA 24210

http://www.deq.virginia.gov

Wyatt, Frederick (DEQ)

From: Mckercher, Elizabeth (DEQ)
Sent: Thursday, May 05, 2016 3:38 PM
To: Newman, Allen (DEQ)
Cc: Richards, Mark (DEQ); Chapman, Martha (DEQ); Trent, Mark (DEQ); Wyatt, Frederick (DEQ); Spencer, William (DEQ); Brockenbrough, Allan (DEQ); Lott, Craig (DEQ)
Subject: RE: Conaway POTW

Hi there Allen,
We are supportive of this approach from the TMDL perspective. Craig did take a look at the potential increase in reductions for the relevant WLAs. He is going to send an email to Martha with his rough calculations.
Best, Liz

Liz McKercher | Watershed Program Manager | DEQ-Central | 629 E Main, Richmond | 804-698-4291

From: Brockenbrough, Allan (DEQ)
Sent: Thursday, May 05, 2016 2:03 PM
To: Newman, Allen (DEQ); Mckercher, Elizabeth (DEQ)
Cc: Richards, Mark (DEQ); Chapman, Martha (DEQ); Trent, Mark (DEQ); Wyatt, Frederick (DEQ); Spencer, William (DEQ)
Subject: RE: Conaway POTW

This sounds like a reasonable approach to me.

Allan

From: Newman, Allen (DEQ)
Sent: Tuesday, May 03, 2016 10:33 AM
To: Mckercher, Elizabeth (DEQ); Brockenbrough, Allan (DEQ)
Cc: Richards, Mark (DEQ); Chapman, Martha (DEQ); Trent, Mark (DEQ); Wyatt, Frederick (DEQ); Spencer, William (DEQ)
Subject: Conaway POTW

Hello Liz and Allan,

Liz and I discussed this AM.

This is my recommendation for the PCB TMDL for Levisa Fork and the proposed Conaway VPDES application.

The proposed location of the new plant is just downstream of the existing POTW with no major increase in watershed area. Therefore, I suggest that we not modify the TMDL, but retain the existing WLA restrictions for the new plant.

The existing POTW design flow is 2.0 MGD and the proposed new design flow is 2.7 MGD. The proposed new permit will contain our standard PCB monitoring requirement and minimization requirements. The additional design flow is for I/I and not new sources. The PSA in their PER has stated that it is more cost effective the treat I/I than remove it. However, we have a consent order that requires the PSA to embark on a 5 yr sewer system evaluation and repair to remove I/I.

The permit has not gone to notice, so I suggest that we just notice the permit and not a TMDL modification. The permit fact sheet will explain that we are imposing the existing TMDL WLA on the new plant and this permit will go to EPA for permit comment.

Comments/questions/objections?

Thanks
Allen

EXECUTIVE SUMMARY

Background and Applicable Standards

Slate Creek (VAS-Q07R_SAT01A00) was first listed as impaired for the General Standard (benthic) according to the *1996 303(d) TMDL Priority List* (VADEQ, 1997). A primary contact (recreational) use impairment was added on the 1998 Section 303(d) list.

Two segments of Levisa Fork were originally listed for aquatic life use impairments on the 1996 303(d) list. Many new segments of Levisa Fork were listed on the 2002 303(d) list as impaired for the fish consumption use for high levels of Total Polychlorinated Biphenyls (tPCBs) in fish tissue. The 2004 303(d) listed the Levisa Fork as impaired for not meeting the primary contact (recreational) use.

The mainstem of Garden Creek from the Right Fork Garden Creek confluence to the Levisa Fork confluence (1.80 miles) was first listed as impaired for the fish consumption use for high levels of tPCBs in fish tissue in 2006.

TMDL Endpoint and Water Quality Assessment

Fecal bacteria TMDLs in the Commonwealth of Virginia are developed using the *E. coli* standard. For this TMDL development, the in-stream *E. coli* target was a geometric mean not exceeding 126-cfu/100 mL. A translator developed by VADEQ was used to convert fecal coliform values to E. coli values.

The General Standard states that waters should be free of substances that are harmful to aquatic life. The stressor determined to be impacting the aquatic life in Levisa Fork and Slate Creek is sediment. The sediment endpoints were calculated from reference watersheds.

Virginia's water quality standards for the maintenance of designated uses include numeric Aroclor PCB criteria for the protection of aquatic life and a tPCBs criterion for the protection of human health. The value of 640 pg/L will be used as the tPCB endpoint for the PCB modeling.

Modeling Procedures

Hydrology

The US Geological Survey (USGS) Hydrologic Simulation Program - Fortran (HSPF) water quality model was selected as the modeling framework to model hydrology and fecal coliform loads in the riverine segments. For purposes of modeling the Levisa Fork watershed, inputs to streamflow and in-stream fecal bacteria, the drainage area was divided into 14 subwatersheds.

The historical stream flow at USGS gage #03207800 in Levisa Fork and precipitation from NCDC stations in Grundy, Hurley, and Richlands, Virginia were used to model the hydrology of the Levisa Fork watershed. Data representing the period 10/1/2000 to 9/30/2003 were used to calibrate the HSPF hydrologic model used in this study. To validate that the HSPF can accurately simulate other time periods, a validation time period of 10/1/1996 to 9/30/1999 was selected.

Fecal Coliform

Wildlife populations, the rate of failure of septic systems, domestic pet populations, and numbers of livestock are examples of land-based nonpoint sources used to calculate fecal coliform loads. Also represented in the model were direct sources of uncontrolled discharges, direct deposition by wildlife, direct deposition by livestock, and direct inputs from sewer overflows. Contributions from all of these sources were updated to current conditions to establish existing conditions for the watershed.

The fecal coliform calibration was conducted using monitored data collected at VADEQ monitoring stations. The water quality calibration was conducted from 10/1/1999 to 9/30/2002; the validation period 10/1/1996 to 9/30/1999. The model provided a comparable match to the VADEQ monitoring data, with output from the model indicating violations of both the instantaneous and geometric mean standards throughout the impaired watersheds.

Sediment

The model used in this study was the *Visual Basic*™ version of the Generalized Watershed Loading Functions (GWLF) model with modifications for use with ArcView (Evans et al., 2001). The target TMDL load for Slate Creek is the average annual load in metric tons per year (t/yr) from the area-adjusted Lick Creek watershed under existing conditions. To reach the TMDL target goal (1,770.63 t/yr), different scenarios were run with GWLF.

The target TMDL load for Levisa Fork is the average annual load in metric tons per year (t/yr) from the area-adjusted Dry Fork watershed under existing conditions. To reach the TMDL target load (17,547.48 t/yr), different scenarios were run using GWLF.

tPCBs

Polychlorinated bi-phenyls (PCBs) are hydrophobic compounds that tend to attach to organic matter, fatty tissue or become dissolved in an organic solvent rather than dissolve in water. These compounds are much more likely to be found in streambed sediments and in fish tissues within a contaminated channel. For this reason, total suspended sediment (TSS) was modeled as the vehicle on which PCBs travel to the surface water, become suspended in the water column, and settle out in streambed sediments. TSS concentrations were calibrated, and then PCBs were attached to the TSS in order to model total PCB concentrations in the stream. This modeling was done using HSPF with an endpoint of 640 pg/L.

Load Allocation Scenarios

The next step in the TMDL processes was to reduce the various source loads to levels that would result in attainment of the water quality standards or endpoints. Because Scenarios were evaluated to predict the effects of different combinations of source reductions on final in-stream water quality. The final TMDL information is shown in Table ES.1.

The final bacterial TMDLs for Levisa Fork and Slate Creek include 100% reductions in straight pipes and sewer overflows.

Table ES.1 Average annual in-stream cumulative pollutant loads modeled after allocation in the Levisa Fork impairments.

Pollutant	Units	Impairment	WLA[1]	LA	MOS	TMDL	Existing Load	Percent Reduction
E. coli	cfu/yr	**Levisa Fork**	7.69E+12	1.93E+14	*Implicit*	2.00E+14	6.20E+14	67.7%
E. coli	cfu/yr	**Slate Creek**	5.29E+11	5.03E+13	*Implicit*	5.08E+13	1.59E+14	68.0%
Sediment	t/yr	**Levisa Fork**	729.66	16,817.78	1,949.76	19,497.20	53,272.75	63.4%
Sediment	t/yr	**Slate Creek**	31.46	1,738.14	197.77	1,967.37	8,321.71	76.4%
tPCBs	mg/yr	**Levisa Fork**	5,009.30	3,421.12	443.71	8,874.14	161,713.44	94.51%
tPCBs	mg/yr	**Garden Creek**	319.10	632.61	50.09	1001.80	2643.93	62.11%

[1] WLA by permit can be found in the corresponding allocation chapters.

Implementation

The goal of the TMDL program is to establish a path that will lead to attainment of water quality standards. The first step in this process is to develop TMDLs that will result in meeting water quality standards. This report represents the first phase of that effort for the impairments in Levisa Fork watershed. The next step will be more monitoring to better establish the sources of PCBs (see Preface). The next step is to develop TMDL implementation plans (IP). The final step is to implement the TMDL IPs and to monitor stream water quality to determine if water quality standards are being attained.

Once a TMDL IP is developed, VADEQ will take the plan to the State Water Control Board (SWCB) for approval for implementing the pollutant allocations and reductions contained in the TMDL. Also, VADEQ will request SWCB authorization to incorporate the TMDL implementation plan into the appropriate waterbody. With successful completion of implementation plans, Virginia begins the process of restoring impaired waters and enhancing the value of this important resource.

In some streams for which TMDLs have been developed, factors may prevent the stream from attaining its designated use. In order for a stream to be assigned, a new designated use, or a subcategory of a use, the current designated use must be removed. The state must also demonstrate that attaining the designated use is not feasible. Information is collected through a special study called a Use Attainability Analysis (UAA). All site-specific criteria or designated use changes must be adopted by the SWCB as amendments to the water quality standards regulations. During the regulatory process, watershed stakeholders and other interested citizens as well as EPA will be able to provide comment during this process.

Public Participation

During development of the TMDL for the impairments in the Levisa Fork study area, public involvement was encouraged through a technical advisory committee (10/9/2008, 13 attendees), a first public meeting (10/9/2008, 14 attendees), and a final public meeting (1/14/2010, 34 attendees). An introduction of the agencies involved, an overview of the TMDL process, details of the pollutant sources, and the specific approach to developing the Levisa Fork TMDLs were presented at the first of the public meeting. Public understanding of and involvement in, the TMDL process was encouraged. Input from this meeting was utilized in the development of the TMDL and improved confidence in the allocation scenarios. The model simulations and the TMDL load allocations were presented during the final public meeting. There was a 30-day public comment period after the final public meeting. Written comments were addressed in the final document.

Table 1. Levisa Fork PCB Results in Water

Ambient Location	Sample Date	Flow Condition	Total PCB (pg/L) *Blank adj	Sample Date	Flow Condition	Total PCB (pg/L) *Blank adj	Comments
6ALEV156.82 - Levisa Fork	9/26/2007	Low	141	3/5/2008	High	428	Above Garden Creek
6AGRF000.56 - Right Fork Garden Creek	9/26/2007	Low	13.2	3/5/2008	High	218	
6AGAR000.16 - Garden Creek	9/26/2007	Low	40	3/5/2008	High	537	
6A LEV152.46 - Levisa Fork	9/26/2007	Low	5.7	3/5/2008	High	372	
6ADIS001.24 - Dismal Creek	9/26/2007	Low	8.3	3/5/2008	High	1,140	
6ABIP000.18 - Big Prater Creek	9/26/2007	Low	0	3/5/2008	High	132	
6ALEV143.80 - Levisa Fork	9/27/2007	Low	35	3/5/2008	High	836	
6ASAT000.26 - Slate Creek	10/23/2007	Low	133	3/5/2008	High	323	
6ABLC002.30 - Bull Creek	10/1/2007	Low	52.4	3/5/2008	High	148	
6AHME000.42 - Home Creek	9/27/2007	Low	11.3	3/5/2008	High	104	
6ALEV131.52 - Levisa Fork	9/27/2007	Low	23	3/5/2008	High	986	
QA/QC Levisa Fork (DI water/field blank)	9/27/2007	NA	16 (QC)	3/5/2008			demonstrates bottle and DI water are PCB free

Table 1.1 Impairments within the Levisa Fork watershed.

Stream Name Impairment Id	Impairment(s) Contracted	Initial Listing Year(s)	2006 River Miles	Listing year Fecal Violations[1]/ Total Samples	2006 Listing Fecal Violations[2]/ Total Samples	Impairment Location Description
Slate Creek VAS-Q04R_SAT01A00	Benthic, *E. coli*	1996, 1998	9.10	6/18	6/18 FC	Upper Rockhouse Branch conf. to Levisa Fork conf.
Garden Creek VAS-Q04R_GAR01A98	tPCBs	2006	1.80	NA	NA	Right Fork Garden Creek to Levisa Fork conf.
Levisa Fork VAS-Q04R_LEV01B02	tPCBs, *E. coli*	2002, 2004	3.80	3/9	3/12 FC	Downstream of Contrary Creek conf. to Garden Creek conf.
Levisa Fork VAS-Q04R_LEV01A94	Benthic, tPCBs, *E. coli*	1996, 2002, 2004	3.95	12/33	9/27FC	Garden Creek conf. to Dismal Creek conf.
Levisa Fork VAS-Q06R_LEV01A98	Benthic, tPCBs, *E. coli*	2002, 2002, 2004	8.10	5/38	1/15 FC	Dismal Creek conf. to Slate Creek conf.
Levisa Fork VAS-Q08R_LEV03A02	tPCBs, Benthic	2002, 2006	6.19	NA	NA	Slate Creek conf. to Bull Creek conf.
Levisa Fork VAS-Q08R_LEV02A00	tPCBs	2002	4.69	NA	NA	Bull Creek conf. to Rocklick Creek conf.
Levisa Fork VAS-Q08R_LEV01A00	Benthic, tPCBs, *E. coli*	1996, 2002, 2004	2.66	10/56	10/47 FC 8/20 *E. coli*	Rocklick Creek conf. to KY state line

FC = Fecal Coliform; EC=*E. coli*; conf=confluence

[1] Based on the interim instantaneous fecal coliform standard of 1000 cfu/100mL for samples collected during the assessment period.

[2] Based on the instantaneous fecal coliform standard of 400 cfu/100mL or the instantaneous *E. coli* standard of 235 cfu/100mL for samples collected during the assessment period.

There are no VPDES Confined Animal Feeding Operations (CAFO), Virginia Pollution Abatement (VPA) facilities, Municipal Separate Storm Sewer Systems (MS4), or surface water and ground water withdrawal permits in the watershed.

Table 3.1 Summary of VPDES permitted point sources in the Levisa Fork watershed.

Permit	Receiving Stream	Facility Name	Permitted for FC Control
VA0026999	Slate Creek	Buchanan County Public Schools - J M Bevins Elementary	Yes
VA0050351	Levisa Fork	Jewell Coke Company Coke Plants 2 and 3	No
VA0052639	Levisa Fork	Norfolk & Western Railway Co -Weller Yard Terminal	No
VA0065536	Dismal Creek	Island Creek Coal Company - VP Mine 1 STP	Yes
VA0065625	Big Prater Creek	Island Creek Coal Company - VP Mine 8 Deskins STP	Yes
VA0066907*	Garden Creek	Consolidation Coal Company - Buchanan Mine STP	Yes
VA0068438	Dismal Creek	Buchanan County Public Schools - Twin Valley High School STP	Yes
VA0089907	Mill Branch	Buchanan County PSA - Mill Branch STP	Yes
VA0090239	Big Prater Creek	Buchanan County PSA - Deskins STP	Yes
VA0090531	Levisa Fork	Buchanan County PSA - Conaway WWTP	Yes

*Accounted for during separate reports on the Garden Creek TMDLs

In Appendix C, Tables C.1 through C.4 include the land-based fecal coliform load distributions and offer more details for specific implementation development and source assessment evaluation.

Table 5.2 Estimated existing and allocated *E. coli* in-stream loads in the Levisa Fork impairment.

Source	Total Annual Loading for Existing Run (cfu/yr)	Total Annual Loading for Allocation Run (cfu/yr)	Percent Reduction
Land Based			
AML	6.88E+11	6.88E+11	0%
Developed	8.44E+10	8.44E+10	0%
Cropland	7.32E+08	7.32E+08	0%
Forest	2.60E+13	2.60E+13	0%
Active Mine	7.88E+05	7.88E+05	0%
Residential	7.24E+12	7.24E+12	0%
Reclaimed Mine	4.26E+06	4.26E+06	0%
Pasture Hay	4.14E+12	4.14E+12	0%
Active Gas Well	9.26E+10	9.26E+10	0%
Direct			
Human	4.22E+14	0.00E+00	100%
Livestock	7.59E+13	7.59E+13	0%
Wildlife	7.85E+13	7.85E+13	0%
Permitted Sources	5.69E+12	5.69E+12	0%
Future Growth	0.00E+00	2.00E+12	NA
Total Loads	**6.20E+14**	**2.00E+14**	**67.7%**

Table 5.3 shows the average annual TMDL, which gives the average amount of bacteria that can be present in the stream in a given year, and still meet the water quality standard. These values are output from the HSPF model and incorporate in-stream die-off and other hydrological and environmental processes involved during runoff and stream routing techniques within the HSPF model framework. To account for future growth of urban and residential human populations, one percent of the final TMDL was set aside for future growth in the WLA portion.

Table 5.3 Final average annual in-stream *E. coli* bacterial loads (cfu/year) modeled after TMDL allocation in the Levisa Fork impairment.

Impairment	WLA[1]	LA	MOS	TMDL[2]
Levisa Fork	**7.63E+12**	**1.93E+14**		**2.00E+14**
VAG400200	*1.74E+09*			
VAG400573	*1.74E+09*			
VAG400405	*1.74E+09*			
VAG400741	*1.74E+09*			
VAG400809	*1.74E+09*			
VAG400404	*1.74E+09*			
VAG400697	*1.74E+09*			
VAG400589	*1.74E+09*			
VAG400192	*1.74E+09*			
VAG400129	*1.74E+09*			
VAG400681	*1.74E+09*			
VAG400682	*1.74E+09*			
VAG400698	*1.74E+09*			
VAG400830	*1.74E+09*			
VAG400190	*1.74E+09*			
VAG400191	*1.74E+09*			
VAG400515	*1.74E+09*			
VAG400211	*1.74E+09*			
VAG400445	*1.74E+09*			
VAG400549	*1.74E+09*			
VAG400613	*1.74E+09*			
VAG400413	*1.74E+09*			
VAG400686	*1.74E+09*			
VAG400727	*1.74E+09*			
VAG400730	*1.74E+09*			
VAG400825	*1.74E+09*			
VAG400087	*1.74E+09*			
VAG400108	*1.74E+09*			
VAG400663	*1.74E+09*			
VAG400729	*1.74E+09*			
VAG400710	*1.74E+09*			
VAG400619	*1.74E+09*			
VAG400680	*1.74E+09*			
VA0090531	*5.39E+12*			
VA0026999	*1.62E+10*			
VA0065536	*5.39E+10*			
VA0068438	*1.94E+10*			

Implicit

Impairment	WLA[1]	LA	MOS	TMDL[2]
VA0089907	*2.02E+10*			
VA0065625	*6.74E+10*			
VA0090239	*8.63E+09*			
Future Load	*2.00E+12*			

[1] The WLA reflects an allocation for potential future permits issued for bacteria control. Any issued permit will include bacteria effluent limits in accordance with applicable permit guidance and will ensure that the discharge meets the applicable numeric water quality criteria for bacteria at the end-of-pipe.

Starting in 2007, the USEPA has mandated that TMDL studies include a daily load as well as the average annual load previously shown. The approach to developing a daily maximum load was similar to the USEPA approved approach to developing load duration bacterial TMDLs. The daily average in-stream loads for Levisa Fork are shown in Table 5.4. The daily TMDL was calculated using the 99th percentile daily flow condition during the allocation time period at the numeric water quality criterion of 235 cfu/100ml. This calculation of the daily TMDL does not account for varying stream flow conditions.

Table 5.4 **Final average daily in-stream *E. coli* bacterial loads (cfu/day) modeled after TMDL allocation in the Levisa Fork impairment.**

Impairment	WLA[1]	LA	MOS	TMDL[2]
Levisa Fork	**2.09E+10**	**1.49E+13**		**1.49E+13**
VAG400200	*4.77E+06*			
VAG400405	*4.77E+06*			
VAG400741	*4.77E+06*			
VAG400809	*4.77E+06*			
VAG400404	*4.77E+06*			
VAG400697	*4.77E+06*			
VAG400192	*4.77E+06*			
VAG400129	*4.77E+06*			
VAG400681	*4.77E+06*			
VAG400682	*4.77E+06*			
VAG400698	*4.77E+06*			
VAG400830	*4.77E+06*			
VAG400190	*4.77E+06*			
VAG400191	*4.77E+06*			
VAG400515	*4.77E+06*			
VAG400211	*4.77E+06*			
VAG400445	*4.77E+06*			
VAG400549	*4.77E+06*			
VAG400613	*4.77E+06*			
VAG400413	*4.77E+06*			
VAG400686	*4.77E+06*			
VAG400727	*4.77E+06*			
VAG400730	*4.77E+06*			
VAG400825	*4.77E+06*			
VAG400087	*4.77E+06*			
VAG400108	*4.77E+06*			
VAG400663	*4.77E+06*			
VAG400729	*4.77E+06*			
VAG400710	*4.77E+06*			
VAG400619	*4.77E+06*			
VAG400680	*4.77E+06*			
VA0090531	*1.48E+10*			
VA0026999	*4.43E+07*			
VA0065536	*1.48E+08*			
VA0068438	*5.32E+07*			
VA0089907	*5.54E+07*			
VA0065625	*1.85E+08*			

Implicit

Impairment	WLA[1]	LA	MOS	TMDL[2]
VA0090239	*2.36E+07*			
Future Load	*5.49E+09*			

[1] The WLA reflects an allocation for potential future permits issued for bacteria control. Any issued permit will include bacteria effluent limits in accordance with applicable permit guidance and will ensure that the discharge meets the applicable numeric water quality criteria for bacteria at the end-of-pipe.
[2] The TMDL is presented for the 99th percentile daily flow condition at the numeric water quality criterion of 235 cfu/100ml. The TMDL is variable depending on flow conditions. The numeric water quality criterion will be used to assess progress toward TMDL goals.

5.4.2 Slate Creek

Table 5.5 shows allocation scenarios used to determine the final TMDL for Slate Creek. Because Virginia's standard does not permit any exceedances, modeling was conducted for a target value of 0% exceedance of the VADEQ riverine primary contact recreational (swimming) use geometric mean standard. The existing condition, Scenario 1, shows 83.3% violations of the geometric mean standard. Although the existing conditions had violations, Scenario 2 (eliminating illicit residential discharges or straight pipes) showed dramatic improvement. Scenario 3 showed that eliminating straight pipes and unpermitted sewer overflows would benefit water quality and allows Slate Creek to have a 0% violation rate of the GM swimming use standard.

An appropriate Stage I scenario would be a 50% reduction in both the straight pipe bacteria load and the unpermitted sewer overflow load. This reduction scenario gets Slate Creek to a 2.8% violation rate of the GM standard.

Table 11.6 Final TMDL allocation scenario for the impaired Levisa Fork watershed.

Sediment Source	Existing Levisa Loads t/yr	Scenario 1 Reductions (Final) (%)	Scenario 1 Allocated Loads t/yr	Scenario 2 Reductions (%)	Scenario 2 Loads t/yr	Scenario 3 Reductions (%)	Scenario 3 Loads t/yr
Pervious Area:							
ActiveGasWell	3,476.01	73	938.520	79	729.96	91	312.84
AML	13,226.56	74	3,438.91	80	2,645.31	92	1,058.12
Barren	117.15	74	30.46	76	28.12	91	10.54
Developed	138.57	71	40.19	0	138.57	91	12.47
Forest	3,250.03	0	3,250.03	0	3,250.03	0	3,250.03
OpenWater	0.00	0	0.00	0	0.00	0	0.00
Residential	2,174.94	74	565.48	0	2,174.94	91	195.74
RowCrop - High till	400.08	72	112.02	77	92.02	0	400.08
Disturbed Forest	8,312.09	74	2,161.14	79	1,745.54	93	581.85
Pasture	6,565.43	74	1,707.01	79	1,378.74	0	6,565.43
Hay	112.39	0	112.39	0	112.39	0	112.39
Impervious Area:							
Developed	37.84	69	11.73	0	37.84	89	4.16
Residential	75.66	71	21.94	0	75.66	91	6.81
Direct Sources:							
Streambank Erosion	671.77	74	174.66	77	154.51	92	53.74
Straight Pipes	30.00	100	0.00	100	0.00	100	0.00
Permitted Sources (WLA):							
DEQ - VPDES	115.83	0	115.83	0	115.83	0	115.83
DMME - Mining	208.39	0	418.86	0.00	418.86	0	418.86
Slate Creek Loads*	8,321.71	78.74	1,769.60	78.74	1,769.60	78.74	1,769.60
Bull Creek Loads*	6,038.30	58.87	2,483.70	58.87	2,483.70	58.87	2,483.70
Future Growth (WLA)	0.00	0	194.97	0	194.97	0	194.97
MOS	0.00	0	1,949.76	0	1,950.61	0	1,950.04
Watershed Target Total	**53,272.75**	**70.15**	**17,547.44**	70.15	17,546.59	70.15	17,547.16
TMDL (Target+MOS)			**19,497.20**				

*Existing and allocated loads were taken from the TMDLs for the two creeks since they fall within the current study area. No additional reductions were recommended since the percentage reductions called for in Table 11.6 are the same in the corresponding, previously developed TMDLs.

The active mining permits issued by the Virginia DMME are shown in Table 11.7 with the existing and allocated loads. These loads were summed and entered into Table 11.6.

The final overall sediment load reduction required for Levisa Fork is 54% (Table 11.8).

Table 11.8 Required sediment reductions for Levisa Fork.

Load Summary	Levisa Fork (t/yr)	Reductions Required (t/yr)	(% of existing load)
Existing Sediment Load	53,272.75		
Target Modeling Load	17,547.48		
Final Allocated Load (WLA+LA)	17,547.44	35,725.31	70.15%

The sediment TMDL for Levisa Fork includes three components – WLA, LA, and the 10% MOS. The WLA was calculated as the sum of all permitted point source discharges. The LA was calculated as the target TMDL load minus the WLA load minus the MOS (Table 11.9).

Table 11.9 Average annual sediment TMDL for Levisa Fork.

Impairment	WLA t/yr	LA t/yr	MOS t/yr	TMDL t/yr
Levisa Fork	**729.66**	**16,817.78**	**1,949.76**	**19,497.20**
VAR101038	4.70			
VAR104503	0.86			
VAR102495	0.16			
VAR104799	0.19			
VAR050018	4.50			
VAR050059	0.54			
VAR050102	0.62			
VAR051686	1.73			
VAG110243	0.49			
VAG750020	0.41			
VAG400200	0.04			
VAG400573	0.04			
VAG400405	0.04			
VAG400741	0.04			
VAG400809	0.04			
VAG400404	0.04			
VAG400697	0.04			
VAG400589	0.04			
VAG400192	0.04			
VAG400129	0.04			
VAG400681	0.04			
VAG400682	0.04			
VAG400698	0.04			
VAG400830	0.04			
VAG400190	0.04			
VAG400191	0.04			
VAG400515	0.04			
VAG400211	0.04			
VAG400445	0.04			
VAG400549	0.04			
VAG400613	0.04			
VAG400413	0.04			
VAG400686	0.04			
VAG400727	0.04			
VAG400730	0.04			
VAG400825	0.04			
VAG400342	0.04			
VAG400678	0.04			
VAG400087	0.04			
VAG400108	0.04			
VAG400663	0.04			
VAG400729	0.04			
VAG400710	0.04			
VAG400680	0.04			
VA0050351	13.83			

Impairment	WLA t/yr	LA t/yr	MOS t/yr	TMDL t/yr
VA0052639	0.04			
VA0065536	0.83			
VA0065625	1.04			
VA0066907	0.83			
VA0068438	0.30			
VA0089907	0.31			
VA0090239	0.13			
VA0090531	82.96			
Future Growth	*194.97*			
Surface Mining Transient Permits:	418.86			
1100470	*2.36*			
1101381	*18.85*			
1101553	*11.10*			
1101752	*24.92*			
1101792	*9.64*			
1101846	*7.80*			
1101881	*0.35*			
1101903	*1.47*			
1101987	*5.74*			
1102001	*17.57*			
1102030	*3.76*			
1200194	*1.68*			
1200235	*1.03*			
1200282	*0.24*			
1200308	*2.59*			
1200335	*0.09*			
1200354	*2.32*			
1200881	*0.28*			
1201015	*0.75*			
1201050	*0.40*			
1201053	*0.17*			
1201091	*2.13*			
1201131	*0.10*			
1201182	*1.54*			
1201230	*0.36*			
1201273	*0.97*			
1201310	*0.19*			
1201345	*0.56*			
1201348	*3.20*			
1201373	*0.11*			
1201442	*0.21*			
1201484	*0.78*			
1201495	*0.45*			
1201508	*0.52*			
1201523	*0.31*			
1201532	*0.14*			
1201574	*0.98*			

Impairment	WLA t/yr	LA t/yr	MOS t/yr	TMDL t/yr
1201698	*0.14*			
1201716	*0.96*			
1201749	*0.59*			
1201753	*5.59*			
1201902	*0.79*			
1201906	*0.09*			
1201907	*0.20*			
1202036	*0.43*			
1300120	*1.26*			
1300359	*5.88*			
1300378	*0.76*			
1300379	*3.44*			
1300398	*1.52*			
1300404	*1.14*			
1300417	*1.24*			
1300425	*11.26*			
1300426	*18.00*			
1300451	*1.79*			
1300453	*14.53*			
1300454	*2.52*			
1300945	*0.25*			
1301156	*1.20*			
1301226	*13.44*			
1400047	*79.20*			
1400345	*4.38*			
1400419	*0.95*			
1400492	*16.14*			
1400493	*8.26*			
1400496	*9.03*			
1400498	*5.46*			
1401039	*1.37*			
1401167	*2.61*			
1401181	*0.69*			
1401232	*5.10*			
1401489	*9.66*			
1401493	*1.44*			
1401531	*10.45*			
1401598	*4.65*			
1401635	*3.67*			
1500384	*5.82*			
1601787	*19.31*			
1601816	*6.08*			
1700864	*5.87*			
1701300	*6.02*			
1801821	*0.02*			

Table 14.7 Final average annual in-stream PCB loads (mg/year) modeled after TMDL allocation in the Levisa Fork impairment.

Source	WLA (mg/yr)	LA (mg/yr)	MOS (mg/yr)	TMDL (mg/yr)	Existing (mg/yr)	% Reductions Needed
VPDES permits:						
VA0090531	*1,769.76*				*4,489.85*	60.58%
VA0050351	*176.98*				*55.37*	0%
VA0052639	*0.88*				*61.43*	98.56%
VPDES permits total	**1,947.62**				**4,606.65**	57.7%
DMME permits total[1]	**3,061.68**				**440.12**	0%
Nonpoint Source Land Loads[2]		**3,419.73**			**156,665.28**	97.82%
Atmospheric Deposition		**1.39**			**1.39**	0%
MOS			**443.71**			0%
Total	**5,009.30**	**3,421.12**	**443.71**	**8,874.14**	**161,713.44**	94.51%

[1] DMME permits are shown individually in Table 14.8
[2] includes the known contaminated sites and all other non-mining land uses

Table 14.8 shows each DMME mining permits' estimated existing and allocated PCB load.

Starting in 2007, the USEPA has mandated that TMDL studies include a daily load as well as the average annual load previously shown. The approach to developing a daily maximum load was similar to the USEPA approved approach to developing load duration TMDLs. The daily average in-stream PCB loads for Levisa Fork are shown in Table 14.9. The daily TMDL and WLAs were calculated as the annual value divided by 365. The LA is the difference between the TMDL and the WLA. This calculation of the daily TMDL does not account for varying stream flow conditions.

Table 14.9 Final average daily in-stream PCB loads (mg/day) modeled after TMDL allocation in the Levisa Fork impairment.

Source	WLA (mg/ day)	LA (mg/ day)	MOS (mg/ day)	TMDL (mg/ day)
VPDES permits:				
VA0090531	*4.85*			
VA0050351	*0.48*			
VA0052639	*0.002*			
VPDES permits total	**5.34**			
DMME permits total	**8.39**			
Nonpoint Source Land Loads[1]		**9.36**		
Atmospheric Deposition		**0.004**		
MOS			**1.22**	
Total	**13.72**	**9.36**	**1.22**	**24.31**

[1] includes the known contaminated sites and all other non-mining land uses

2014 Impaired Waters

SWRO Categories 4 and 5

Cause Group Code: **Q04R-01-PCB** **Levisa Fork and Garden Creek**

Location: This segment begins at the Levisa Fork headwaters and continues downstream to the Kentucky state line and Garden Creek from the confluence of Right Fork Garden Creek downstream to the confluence with Levisa Fork.

City / County: Buchanan Co.

Use(s): Fish Consumption

Cause(s) /
VA Category: PCB in Fish Tissue/ 4A

The Fish Tissue station locate at 6AGAR000.16 found polychlorinated biphenyls (PCBs) in the sediment and station 6AGAR001.78 exceeded DEQ's screening value for PCBs. Station 6ALEV130.00 exceeded the Virginia Department of Health's (VDH)human health criteria for PCBs. PCBs were also detected a Fish Tissue station 6ALEV151.26, 6ALEV145.86, 6ALEV134.82, and 6ALEV130.00.

Assessment Unit / Water Name / Description	Cause Category / Name	Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
VAS-Q04R_GAR01A98 / Garden Creek / Garden Creek from confluence with Levisa Fork, upstream through Mavisdale to confluence of Right Fork Garden Creek, WQS Section 3.	4A PCB in Fish Tissue		2004	3/18/2011	1.82
VAS-Q04R_LEV01A94 / Levisa Fork / Mainstem from the confluence of Garden Creek, river mile 155.94 at Oakwood, to the confluence of Dismal Creek at Route 460 crossing, river mile 151.84, WQS Section 3.	4A PCB in Fish Tissue		2006	3/18/2011	3.95
VAS-Q04R_LEV01B02 / Levisa Fork / Levisa Fork downstream of Contrary Creek confluence through Keen Mountain to Garden Creek confluence, WQS Section 3.	4A PCB in Fish Tissue		2006	3/18/2011	3.94
VAS-Q06R_LEV01A98 / Levisa Fork / Mainstem from Dismal Creek confluence, river mile 151.84, downstream to Slate Creek confluence in Grundy, river mile 143.71 in WQS Section 3.	4A PCB in Fish Tissue		2006	3/18/2011	8.26
VAS-Q08R_LEV01A00 / Levisa Fork / From Rocklick Branch at Big Rock downstream to the Kentucky state line. VPDES permit for Buchanan County PSA/Conaway WWTP is in this segment, WQS Section 3.	4A PCB in Fish Tissue		2006	3/18/2011	2.68
VAS-Q08R_LEV02A00 / Levisa Fork / From Rocklick Branch at Big Rock upstream parallel Route 460 to Bull Creek confluence near Harman Junction, WQS Section 3.	4A PCB in Fish Tissue		2006	3/18/2011	4.72
VAS-Q08R_LEV03A02 / Levisa Fork / From Slate Creek confluence in Grundy downstream parallel Route 460 to Bull Creek confluence, WQS Section 3.	4A PCB in Fish Tissue		2006	3/18/2011	6.31

Levisa Fork and Garden Creek **Fish Consumption**	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
PCB in Fish Tissue - Total Impaired Size by Water Type:			**31.68**

Sources:

Source Unknown

Cause Group Code: **Q04R-01-BEN** **Levisa Fork and Tributaries**

Location: This segment includes the Levisa Fork mainstem from the confluence of Garden Creek, river mile 155.94, downstream to the confluence of Bull Creek and from the Rocklick Branch confluence downstream to the Kentucky state line. It also includes the Slate Creek mainstem from the Upper Rockhouse Branch confluence downstream to the confluence with the Levisa Fork, Home Creek from the confluence with the Levisa Fork upstream to the Spencer Fork confluence, and Poplar Creek downstream to the confluence with Levisa Fork.

City / County: Buchanan Co.

Use(s): Aquatic Life

Cause(s) /
VA Category: Benthic-Macroinvertebrate Bioassessments/ 4A

Stations located at 6ASAT000.05, 6ASAT004.52, 6ASAT007.71 and6AHME002.16 were impaired based on VSCI scores. Station 6ALEV152.46 was impaired based on VSCI scores of 41 and 57 in 2007 and station 6ALEV130.29 was impaired based on VSCI scored of 38 and 54 in 2007. Non agency biological monitoring data provided by Appalachian Technical Services indicated impairment based on VSCI scores.

Assessment Unit / Water Name / Description	Cause Category / Name		Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
VAS-Q04R_LEV01A94 / Levisa Fork / Mainstem from the confluence of Garden Creek, river mile 155.94 at Oakwood, to the confluence of Dismal Creek at Route 460 crossing, river mile 151.84, WQS Section 3.	4A	Benthic-Macroinvertebrate Bioassessments		2004	3/18/2011	3.95
VAS-Q06R_LEV01A98 / Levisa Fork / Mainstem from Dismal Creek confluence, river mile 151.84, downstream to Slate Creek confluence in Grundy, river mile 143.71 in WQS Section 3.	4A	Benthic-Macroinvertebrate Bioassessments		2002	3/18/2011	8.26
VAS-Q07R_SAT01A00 / Slate Creek / Mainstem from the Upper Rockhouse Branch confluence near Matney downstream to the confluence with Levisa Fork in Grundy, WQS Section 3.	4A	Benthic-Macroinvertebrate Bioassessments		2004	3/18/2011	9.37
VAS-Q08R_LEV01A00 / Levisa Fork / From Rocklick Branch at Big Rock downstream to the Kentucky state line. VPDES permit for Buchanan County PSA/Conaway WWTP is in this segment, WQS Section 3.	4A	Benthic-Macroinvertebrate Bioassessments		2002	3/18/2011	2.68
VAS-Q08R_LEV03A02 / Levisa Fork / From Slate Creek confluence in Grundy downstream parallel Route 460 to Bull Creek confluence, WQS Section 3.	4A	Benthic-Macroinvertebrate Bioassessments		2006	3/18/2011	6.31
VAS-Q08R_PLR01A08 / Poplar Creek / Mainstem from Poplar Fork confluence downstream to confluence with Levisa Fork near Harman Junction.	4A	Benthic-Macroinvertebrate Bioassessments	Y	2014	3/18/2011	3.03

Levisa Fork and Tributaries Aquatic Life	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Benthic-Macroinvertebrate Bioassessments - Total Impaired Size by Water Type:			**33.60**

Sources:

Coal Mining	Impacts from Abandoned Mine Lands (Inactive)	Non-Point Source	Rural (Residential Areas)

Cause Group Code: **Q04R-01-BAC** **Levisa Fork and Tributaries**

Location: This segment includes the Levisa Fork mainstem from the headwaters downstream to the Slate Creek confluence, from the Bull Creek confluence downstream to the Kentucky state line, Slate Creek from the Upper Rockhouse Branch confluence downstream to the confluence with the Levisa Fork, the mainstem of Dismal Creek from the confluence of Hurricane Branch to the confluence with Levisa Fork.

City / County: Buchanan Co.

Use(s): Recreation

Cause(s) /
VA Category: Escherichia coli/ 4A Fecal Coliform/ 4A

The AWQM station located at 6ALEV156.82 had a 60% exceedance of the E.coli water quality standard, station 6ADIS001.24 had a 11% exceedance of the E.coli water quality standard, station 6ADIS014.33 had a 18% exceedance of the E. coli standard, station 6ALEV143.80 had a 40% exceedance of the E. coli water quality standard, station 6ASAT000.26 had a 43% exceedance of the E. coli standard and station 6ALEV131.52 had a 16% exceedance of the E. coli water quality standard.

Assessment Unit / Water Name / Description	Cause Category / Name	Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
VAS-Q04R_LEV01A94 / Levisa Fork / Mainstem from the confluence of Garden Creek, river mile 155.94 at Oakwood, to the confluence of Dismal Creek at Route 460 crossing, river mile 151.84, WQS Section 3.	4A Escherichia coli		2010	3/18/2011	3.95
VAS-Q04R_LEV01B02 / Levisa Fork / Levisa Fork downstream of Contrary Creek confluence through Keen Mountain to Garden Creek confluence, WQS Section 3.	4A Escherichia coli		2010	3/18/2011	3.94
VAS-Q06R_LEV01A98 / Levisa Fork / Mainstem from Dismal Creek confluence, river mile 151.84, downstream to Slate Creek confluence in Grundy, river mile 143.71 in WQS Section 3.	4A Escherichia coli		2010	3/18/2011	8.26
VAS-Q07R_SAT01A00 / Slate Creek / Mainstem from the Upper Rockhouse Branch confluence near Matney downstream to the confluence with Levisa Fork in Grundy, WQS Section 3.	4A Escherichia coli		2008	3/18/2011	9.37
VAS-Q08R_LEV01A00 / Levisa Fork / From Rocklick Branch at Big Rock downstream to the Kentucky state line. VPDES permit for Buchanan County PSA/Conaway WWTP is in this segment, WQS Section 3.	4A Escherichia coli		2006	3/18/2011	2.68
VAS-Q08R_LEV02A00 / Levisa Fork / From Rocklick Branch at Big Rock upstream parallel Route 460 to Bull Creek confluence near Harman Junction, WQS Section 3.	4A Escherichia coli		2008	3/18/2011	4.72

Levisa Fork and Tributaries Recreation	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Escherichia coli - Total Impaired Size by Water Type:			**32.92**

Assessment Unit / Water Name / Description	Cause Category / Name	Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
VAS-Q04R_LEV01A94 / Levisa Fork / Mainstem from the confluence of Garden Creek, river mile 155.94 at Oakwood, to the	4A Fecal Coliform		2004	3/18/2011	3.95

Assessment Unit / Water Name / Description	Cause Category / Name	Nested	Cycle First Listed	TMDL Schedule or EPA Approval	Size
confluence of Dismal Creek at Route 460 crossing, river mile 151.84, WQS Section 3.					
VAS-Q04R_LEV01B02 / Levisa Fork / Levisa Fork downstream of Contrary Creek confluence through Keen Mountain to Garden Creek confluence, WQS Section 3.	4A Fecal Coliform		2004	3/18/2011	3.94
VAS-Q06R_LEV01A98 / Levisa Fork / Mainstem from Dismal Creek confluence, river mile 151.84, downstream to Slate Creek confluence in Grundy, river mile 143.71 in WQS Section 3.	4A Fecal Coliform		2004	3/18/2011	8.26
VAS-Q07R_SAT01A00 / Slate Creek / Mainstem from the Upper Rockhouse Branch confluence near Matney downstream to the confluence with Levisa Fork in Grundy, WQS Section 3.	4A Fecal Coliform		2002	3/18/2011	9.37

Levisa Fork and Tributaries Recreation	Estuary (Sq. Miles)	Reservoir (Acres)	River (Miles)
Fecal Coliform - Total Impaired Size by Water Type:			**25.52**

Sources:

Sewage Discharges in Unsewered Areas

ATTACHMENT 7

T & E Species

VaFWIS Initial Project Assessment Report Compiled on 3/4/2016, 10:27:50 AM

Help

Known or likely to occur within a **2 mile radius around point 37,21,15.9 -82,12,59.9**

in **027 Buchanan County, VA**

View Map of Site Location

415 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 22) (22 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
050023	FESE	I	Bat, Indiana	Myotis sodalis		BOVA
050021	FESE	II	Bat, gray	Myotis grisescens		BOVA
050035	FESE	II	Bat, Virginia big-eared	Corynorhinus townsendii virginianus		BOVA
050022	FT		Bat, northern long-eared	Myotis septentrionalis		BOVA
010203	SE	II	Darter, variegate	Etheostoma variatum	Yes	BOVA,TEWaters,Habitat,SppObs
070118	FSSE	II	Crayfish, Big Sandy	Cambarus callainus		BOVA
110241	FSST	I	Supercoil, brown	Paravitrea septadens		BOVA
100248	FS	I	Fritillary, regal	Speyeria idalia idalia		BOVA
060029	FS	III	Lance, yellow	Elliptio lanceolata		BOVA
110345	FS	III	Bladetooth, Virginia	Patera panselenus		BOVA
100001	FS	IV	fritillary, Diana	Speyeria diana		BOVA
030012	CC	IV	Rattlesnake, timber	Crotalus horridus		BOVA
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius		BOVA
040319		I	Warbler, black-throated green	Setophaga virens		BOVA
040306		I	Warbler, golden-winged	Vermivora chrysoptera		BOVA
020011		II	Frog, mountain chorus	Pseudacris brachyphona		BOVA,Habitat
020030		II	Salamander, green	Aneides aeneus		BOVA
040052		II	Duck, American black	Anas rubripes		BOVA
040213		II	Owl, northern saw-whet	Aegolius acadicus		BOVA
040320		II	Warbler, cerulean	Setophaga cerulea		BOVA
040304		II	Warbler, Swainson's	Limnothlypis swainsonii		BOVA
040266		II	Wren, winter	Troglodytes		BOVA

				troglodytes		

To view **All 415 species** View 415

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Bat Colonies or Hibernacula: **Not Known**

Anadromous Fish Use Streams

N/A

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters (1 Reach)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Levisa Fork (05070202)	SE	010203	SE	II	Darter, variegate	Etheostoma variatum	Yes

Managed Trout Streams (1 records) (Click on Stream Name to view complete reach history)

View Map of All Trout Stream Surveys

Reach ID	Stream Name	Class	Brook Trout	Brown Trout	Rainbow Trout	View Map
01LEV-01	Levisa Fork	Stockable				Yes

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Habitat Predicted for Aquatic WAP Tier I & II Species (2 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Canaway Creek (05070202)	SE	010203	SE	II	Darter, variegate	Etheostoma variatum	Yes
Levisa Fork (05070202)	SE	010203	SE	II	Darter, variegate	Etheostoma variatum	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
020011		II	Frog, mountain chorus	Pseudacris brachyphona	Yes

Public Holdings:

N/A

Compiled on 3/4/2016, 10:27:50 AM I713331.0 report=IPA searchType= R dist= 3218 poi= 37,21,15.9 -82,12,59.9

PixelSize=64; Anadromous=0.012202; BECAR=0.011646; Bats=0.01046; Buffer=0.100734; County=0.044509; Impediments=0.010526; Init=0.139538; PublicLands=0.012805; SppObs=0.110517; TEWaters=0.013585; TierReaches=0.025198; TierTerrestrial=0.040137; Total=0.584887; Tracking_BOVA=0.137519; Trout=0.014291

TE Waters Group Levisa Fork (05070202)

37,21,15.9 -82,12,59.9 is **the Search Point**

Display	Item Location is
at center	not at map center

Show Position Rings
◉ Yes ○ No
1/2 mile and 1/8 mile at the **Search Point**

Show Search Area
◉ Yes ○ No
2 Search distance miles radius

Search Point is at map center

Base Map Choices
Topography

Map Overlay Choices
Current List: Position, Search, Observation

Map Overlay Legend

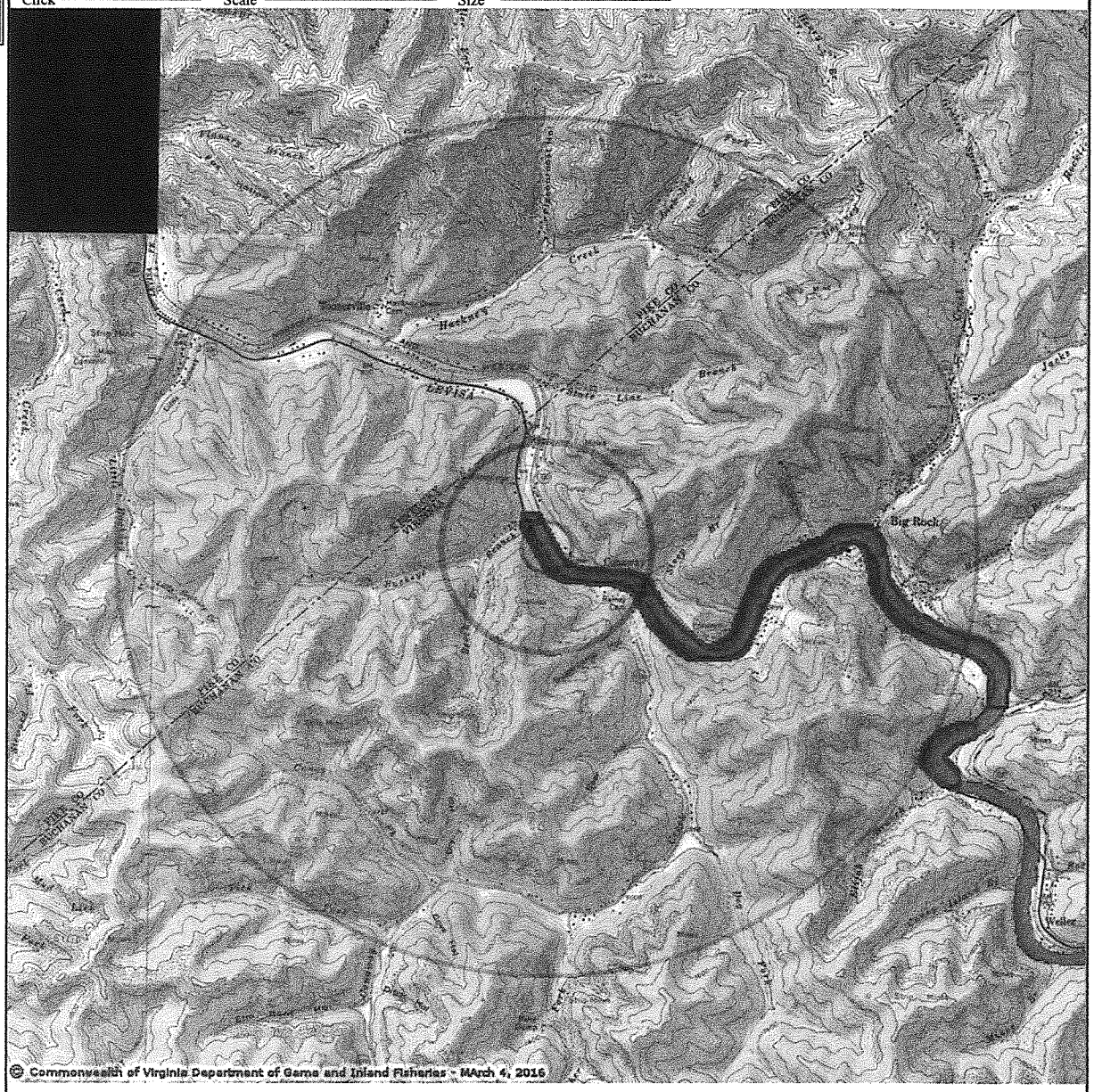
T & E Waters
Federal
Selected Federal
State
Selected State

Position Rings 1/2 mile and 1/8 mile at the Search Point

2 mile radius Search Area

Data Observation Site

back | Refresh Browser Page |
Map Click Pan
Map Scale In Zoom Out
Screen Size Small Size Big
Help



N

500 0 500 1000 1500 2000 Meters
2000 0 2000 4000 6000 8000 Feet

Point of Search 37,21,15.9 -82,12,59.9
Map Location 37,21,15.9 -82,12,59.9

Select **Coordinate System:**
◉ Degrees,Minutes,Seconds Latitude - Longitude
○ Decimal Degrees Latitude - Longitude
○ Meters UTM NAD83 East North Zone
○ Meters UTM NAD27 East North Zone

Base Map source: Topographic maps from TOPO! copyright 2006 (see National Geographic Maps for details)

Map projection is UTM Zone 17 NAD 1983 with left 388253 and top 4138884. Pixel size is 8 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixles. The map display represents 8000 meters east to west by 8000 meters north to south for a total of 64.0 square kilometers. The map display represents 26251 feet east to west by 26251 feet north to south for a total of 24.7 square miles.

Topographic maps and Black and white aerial photography for year 1990+-
are from the United States Department of the Interior, United States Geological Survey.

Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2016-03-04 10:29:03 (qa/qc December 5, 2012 8:04 - tn=713331.0 dist=3218 I)
$poi=37.3544167 -82.2166389$query=select Convert(varchar(10),floor((minx+maxx)/2)) + ' ' + Convert(varchar (10),floor((miny+maxy)/2)) from vafwis_tables.dbo.cvTEWaters where SEG_ID in (0507020212046,0507020212049,0507020212067,0507020212079,0507020212092,0507020212098,0507020212098)

Wyatt, Frederick (DEQ)

From: vanhde@natureserve.org
Sent: Thursday, April 14, 2016 2:32 PM
To: Wyatt, Frederick (DEQ)
Subject: Buchanan County PSA-Big Rock/Conaway WWTP has completed initial review

Dear Clairise R Shaheen,

An initial review of your project, entitled 'Buchanan County PSA-Big Rock/Conaway WWTP', has been completed. The resulting report can be found here. To view the project page, shapefile and any attachments, click here. If natural heritage resources are documented or predicted within the search radius, DCR will provide additional comments via email within thirty calendar days or within 5 business days if priority service was selected. If no natural heritage resources are documented or predicted within the search radius, no further coordination is needed with this office. The report can be saved and/or printed for your files.

Thank you for submitting this project for review.

DCR-VA Natural Heritage Program

Molly Joseph Ward
Secretary of Natural Resources

Clyde E. Cristman
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

The project mapped as part of this report has been searched against the Department of Conservation and Recreation's Biotics Data System for occurrences of natural heritage resources in the vicinity of the area indicated for this project. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics, natural heritage resources have not been documented within two miles of the identified project boundaries. In addition, the project area does not intersect any of the predictive models identifying potential habitat for natural heritage resources.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

Any absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks additional natural heritage resources. New and updated information is continually added to Biotics. Please revisit this website or contact DCR for an update on this natural heritage information if a significant amount of time passes (DCR recommends no more than one year) before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, that may contain information not documented in the Natural Heritage Data Explorer. Their database may be accessed from http://vafwis.org/fwis/ or contact Gladys Cason (804-367-0909 or Gladys.Cason@dgif.virginia.gov).

Thank you for submitting your project to the Virginia Department of Conservation and Recreation's Natural Heritage Data Explorer Web Service. Should you have any questions or concerns about this report, the Data Explorer, or other Virginia Natural Heritage Program services, please contact the Natural Heritage Project Review Unit at 804-371-2708.

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

Web Project ID: WEB0000005027

Client Project Number: VA0092916

PROJECT INFORMATION

TITLE: Buchanan County PSA-Big Rock/Conaway WWTP

DESCRIPTION: New issuance for 2.7 MGD WWTP with discharge to Levisa Fork at river mile 6ALEV130.63

EXISTING SITE CONDITIONS: Proposed discharge is to Levisa Fork with estimated complete mix at 200 feet at low flow

QUADRANGLES: Harman

COUNTIES: Buchanan

Latitude/Longitude (DMS): 37°21'16.4141"N / 82°13'0.2559"W

Acreage: 0 acres

Comments: Calculations for preliminary limits are based are the following flow frequencies: 1Q10: Stream Flow : 7.3 MGD 7Q10 Stream Flow: 8.6 MGD 30Q10 Stream Flow: 12 MGD and are: 30/30 mg/l for BOD5 and TSS, and monthly average of 5.8 mg/l for ammonia nitrogen with UV disinfection.

REQUESTOR INFORMATION

Priority: N | Tier Level: Tier II | Tax ID:

Contact Name: Fred Wyatt

Company Name: Department of Environmental Quality

Address: 355-A Deadmore Street

City: Abingdon | State: VA | Zip: 24210

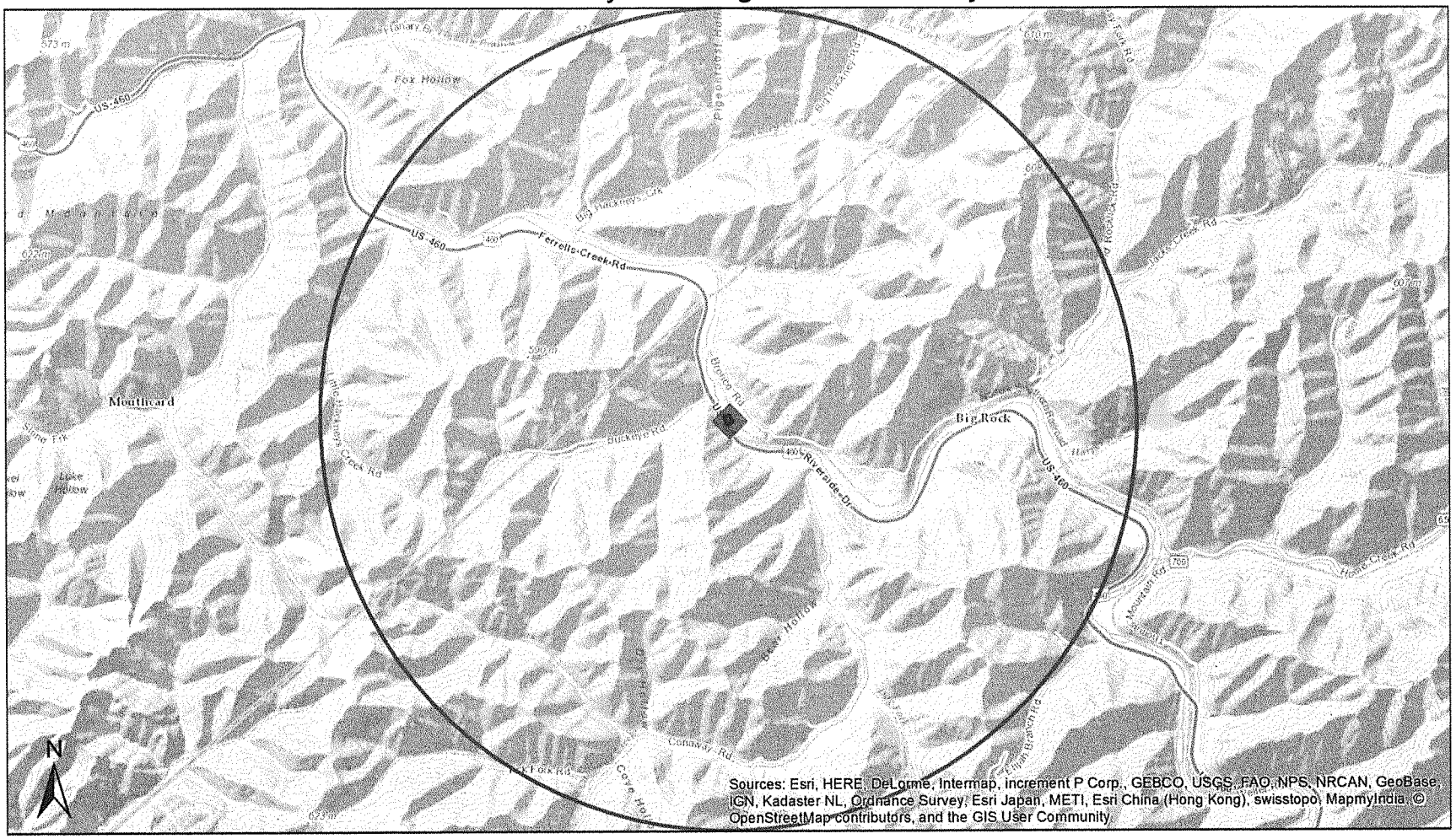
Phone: 276-676-4810 Fax: 276-676-4899 Email: frederick.wyatt@deq.virginia.gov

Conservation Site	Site Type	Brank	Acreage	Listed Species Presence
Natural Heritage Screening Features within Search Radius				

Site Name	Group Name	Common Name	Scientific Name	GRANK	SRANK	Fed Status	State Status	EO Rank	Last Obs Date	Precision
Natural Heritage Resources within Search Radius										

Intersecting Predictive Models
Predictive Model Results

Buchanan County PSA-Big Rock/Conaway WWTP



Project Area
Buffered
NH Screening Features
Conservation Site
GLNHR
SCU

1:51,723
0 0.425 0.85 1.7 mi
0 0.5 1 2 km

Quads: Harman

Counties: Buchanan

Company: Department of Environmental Quality

Lat/Long: 372116 / -821300